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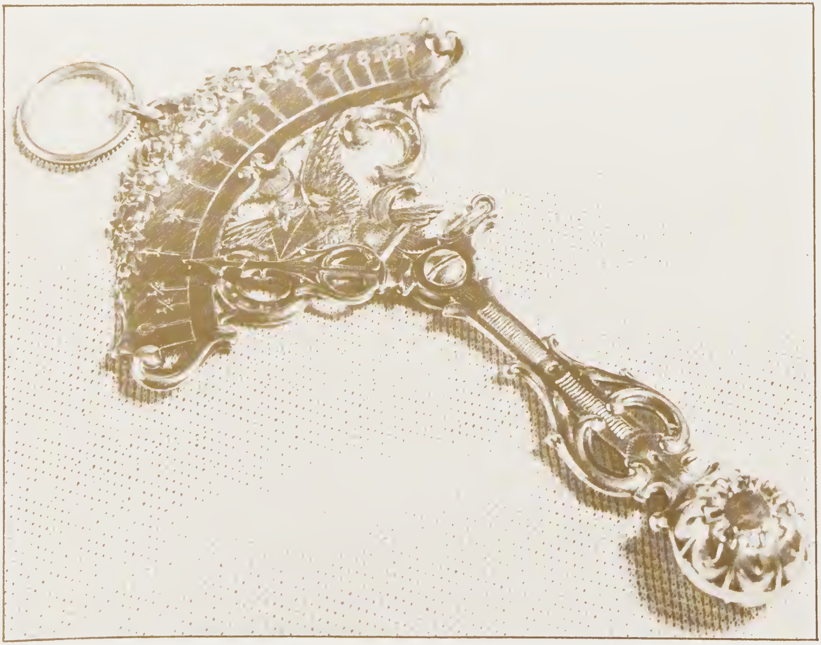
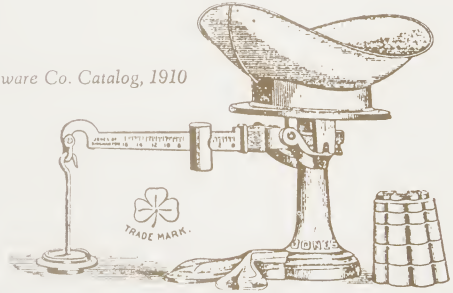


Cover Picture

This Sterling silver pendulum letter balance has a bird holding a letter in its beak, as a centre point of the elaborate decoration. It is graduated 0 to 12 (ounces). Originally, there would have been a letter clip suspended from the short arm of the beam just visible above the screw over the central pivot. The instrument has the mark of Gorham, c.1891. U.S.A.

Courtesy Bill Doniger.

From Biddle Hardware Co. Catalog, 1910



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Editor — Michael A. Crawforth
Associate Editor — Diana Crawforth

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English Coin-Weights 8

NORMAN BIGGS

It will be recalled that by the late 1760s the gold coin current in England had, once again, reached a deplorable state. The good guineas produced by the Mint were hoarded or exported, and trade was conducted with worn guineas and Portuguese pieces. The activities of the Yorkshire Coiners (28), which included the savage murder of an excise inspector, were among the factors which persuaded the Government that remedial measures were necessary. At long last, the root cause of the problem was correctly identified: the lack of facilities for the continual withdrawal and recoinage of light coin.

During the years 1773 - 1776 there was a barrage of legislation designed to solve the problem. The details are confusing. The account given by Craig (6: pp.239-246) is broadly correct, but misleading at several points, and subsequent articles based on Craig's book have repeated the errors. For our purposes, it is important to review some of the details in order to understand the function of the coin-weights produced during this period. The Acts and Orders which authorized the various operations conducted at this time are listed below, Table 1. In the following discussion these Acts and Orders will be referred to by the letters shown in the Table.

SUMMARY OF ACTS, ORDERS & PROCLAMATIONS	
(A)	Light Coin Act 1773 (13 Geo III c.71)
(B)	Treasury Order (23 July 1773)
(C)	Recoinage Act 1774 (14 Geo III c.70)
(D)	Proclamation (24 June 1774)
(E)	Act Regulating Weights 1774 (14 Geo III c.92)
(F)	Act Allowing Officer to take Fees 1775 (15 Geo III c.30)
(G)	Proclamation (12 April 1776)

TABLE 1.

The crucial factor in the legislation of 1773 - 1776 was the re-introduction of a 'least current weight' for gold coins. Although this idea had originated in Proclamations of Elizabeth I and James I (see Part 4), it had lapsed and had never been applied to the guinea coinage. From the outset, the legislation of 1773 - 1776 was directed towards specifying a least current weight of 128 grains for the guinea, as opposed to the full weight of 129.438 grains and the traditional (but merely conventional) standard of 129 grains. The Act (A) of 1773 authorized the defacement of light guineas by anyone to whom they were offered, and especially by the Collectors of Taxes; this was a necessary prerequisite if light coin was to be withdrawn from circulation. At the same time an Order from the Treasury (B) defined the meaning of 'light' in this context. It appears that the immediate demonetization of all guineas below 128 grains had been rejected, because it would have resulted in an unacceptable disruption of trade during the period in which the recoinage was being carried out. Thus a programme of withdrawal in stages was proposed. Guineas dated before 1760 were allowed to remain current for the time being, provided they weighed at least 123 grains, those dated between 1760 and 1771 provided they weighed at least 126 grains, and those dated 1772 or after, provided they weighed at least 128 grains. Proportional figures were specified for the half-guineas and quarter-guineas. All coin below these weights was no longer to be used as money, except that a short period was allowed during which it could be accepted by the Revenue Collectors.

The first batch of coin withdrawn by the Revenue Collectors soon reached the Mint, and the work of recoinage began in August 1773. The whole question was debated in Parliament in 1774, and the Act (C) was passed which effectively sanctioned the programme already in progress. This was followed by a Proclamation (D) announcing the second phase of the withdrawal of light coin, and promised that there would be a third and final phase in due course. This promise was fulfilled by the Proclamation of 1776 (G). The wording of the Proclamations led to some confusion at the time, as reported in the *Gentleman's Magazine* for 1774 (32), and has likewise confused modern historians. Perhaps the best way to summarize the intended effect of these Proclamations is in the form shown in Table 2.

DEMONETISATION OF LIGHT GUINEAS 1773 - 1776				
	GUINEAS WEIGHING			
DATED	Less than 123 gr.	123-126 gr.	126-128 gr.	
Before 1760	1773	1774	1776	Date Demonetised
1760 - 1771	1773	1773	1776	
After 1771	1773	1773	1773	

TABLE 2.

As might be expected, this complex legislation led to a new group of coin-weights for checking the guineas of various standards. A very rough division of the weights into two classes may be attempted. The first class comprises weights intended for use during the time in which two or three different standards were in operation, while the second class comprises those weights intended for use after the final establishment of the 128 grain standard. Thia classification is a useful starting point, but it cannot be interpreted too strictly, because some weights from the first class continued to be used in later years, and because the legislation was not enforced uniformly anyway.

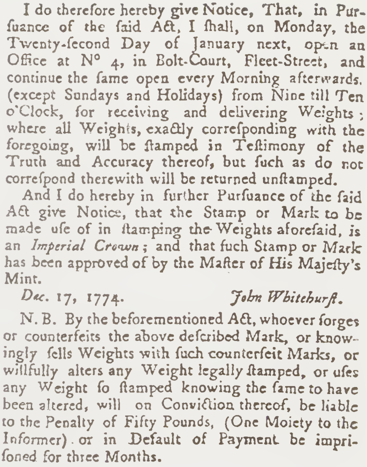
There are a few examples of weights referring to the 123 grain standard, Fig 1, but this standard operated for a short time only, and the weights are correspondingly scarce. By contrast, there are many sets of weights relating to the 126/128 'double standard'. Typically, a set of this kind contains two weights for guineas, marked 5 dwt 6 gr and 5 dwt 8 gr, and two weights for half-guineas, marked 2 dwt 14 gr and 2 dwt 16 gr. Weights for quarter-guineas, marked 1 dwt 7 gr and 1 dwt 8 gr are frequently, but not always, included in these sets. Several types bear a portrait of George III on the obverse: in particular, there is a characteristically distinguished set by Kirk, Fig 2, and another set rather obviously imitating his style, Figs 3,4. Many types carry some explicit reference to the 1771/1772 borderline, with legends such as COINED BEFORE 1772, Fig 5; COINED SINCE 1772, Fig 6; GEO III UP TO 1 JAN 1772, Fig 7; and PRIOR TO 1772, Fig 8. There are also several types of plain uniface weights, a few of them being notable because they are square or rectangular, Fig 9, although most of them are circular, Fig 10.

The 'double standard' weights referred to in the previous paragraph were needed to check coins which were legal currency in the years 1773 - 1776. The 'New Standard' of 128 grains could, of course, be checked by using the relevant weights from the sets for the double standard, but there are a great many additional types for the New Standard alone. Several of them carry a portrait of George III, one such type bearing the name PHILLIPS, Fig 11, and another the name GRICE Fig 12. The date 1775 on these weights may refer to the year of manufacture, because the New Standard was announced in 1774, and enforced (theoretically) in 1776. The date 1775 also occurs on weights which mention the Act of Parliament, Fig 13, and the New Standard, Fig 14. Other types bear the dates 1776, Fig 15, and 1777 Fig 16. There are also very many miscellaneous types, identifiable by the words STANDARD, Fig 17, or GUINEA WT, Fig 18, or simply the numbers 5 8 Fig 19.

Another aspect of the legislation of 1773 - 1776 was specifically related to the practice of putting an official stamp on coin-weights. The second Act (E) of 1774 provided for the appointment of an officer to keep duplicates of the standard Mint weights, and to verify amd stamp coin-weights used by the public. The man appointed to this post was John Whitehurst, a Fellow of the Royal Society, who was famous for his accurate clocks (37), and who was also the originator of important ideas in geology (33). Whitehurst was required by the Act to publish a description of his official stamp in the *London Gazette*, "three times at least" before 31 December 1774. This he did, Fig A, choosing for his mark the Imperial Crown. The work of stamping was evidently great, for in 1775 an additional Act (F) was passed empowering Whitehurst to charge a fee for stamping weights, in order that he might employ an 'extraordinary number' of assistants. A great many weights dating from this period bear the official crown stamp, Figs 11,12,13,16 & 17, and it appears that Whitehurst and his assistants were kept busy for a number of years. A full account of the history of the Office has been written by Graham Dyer (35).

In addition to the Imperial Crown, there are several other devices to be found stamped upon coin-weights of this period. It will be recalled (part 6) that as long ago as 1614 the Founders' Company had been granted the right to inspect and stamp brass weights used in London, but they had implemented this right in regard to coin-weights only very briefly, around

FIG A. John Whitehurst's Announcement of the new office for stamping of money weights, from The London Gazette, No.11518 13th - 17th December 1774.



I do therefore hereby give Notice, That, in Purſuance of the ſaid Act, I ſhall, on Monday, the Twenty-ſecond Day of January next, open an Office at N° 4, in Bolt-Court, Fleet-Street, and continue the ſame open every Morning afterwards, (except Sundays and Holidays) from Nine till Ten o'Clock, for receiving and delivering Weights; where all Weights, exactly correſponding with the foregoing, will be ſtamped in Teſtimony of the Truth and Accuracy thereof, but ſuch as do not correſpond therewith will be returned unſtamped.

And I do hereby in further Purſuance of the ſaid Act give Notice, that the Stamp or Mark to be made uſe of in ſtamping the Weights aforeſaid, is an *Imperial Crown*; and that ſuch Stamp or Mark has been approved of by the Maſter of His Majeſty's Mint.

Dec. 17, 1774. *John Whitehurſt.*

N.B. By the beforementioned Act, whoever forges or counterfeits the above deſcribed Mark, or knowingly ſells Weights with ſuch counterfeit Marks, or willfully alters any Weight legally ſtamped, or uſes any Weight ſo ſtamped knowing the ſame to have been altered, will on Conviction thereof, be liable to the Penalty of Fifty Pounds, (One Moiety to the Informer) or in Default of Payment be impriſoned for three Months.

1700. During the passage of the Act (E) through Parliament, the Company petitioned to ensure that its traditional rights were respected, and the Act was amended so that this was mentioned explicitly. The mark of the Founders' Company was the ewer, or coffee-pot, and it is found at least as often as the crown on guinea weights from this period, Figs 2,3,4,6,14,15. Other stamps, for which no documentary authorisation has been discovered, also appear: the anchor of the Birmingham Assay Office, Figs 10,19; and the lion of Goldsmiths' Hall in London, Fig 18.

The use of coin-weights seems to have been fairly widespread for many years after the legislation in the mid-1770s. The New Standard was officially the only criterion, so that guineas over 128 grains were worth 21s, and those below were bullion, not coin. But all the evidence suggests that the 126 grain standard continued to be used unofficially; indeed, it was not until 1786 that the banks gave notice of their intention to refuse all guineas below 128 grains (6, p.246). The period 1773-1795 also saw an enormous increase in the production of coin scales, many of which were sold with specially designed weights. In addition to the traditional wooden boxes with 'loose' weights, there were japanned tin boxes with recesses for knobbed weights (many illustrated in the second part of Ronald Stocks' article in *Equilibrium* (36), and folding balances (Crawforth; 34), as well as a number of other, more intricate devices.

The end of this period of coin-weight production in England was an indirect result of the Napoleonic wars. In 1797, the country's gold reserve fell disastrously and an Act was passed to restrict the changing of paper notes into gold. For the next twenty years there was little gold in circulation, and the weights already in use were more than adequate to meet the demand, with one small exception. Between 1797 and 1813, a number of one-third guinea, or seven-shilling, gold pieces were minted. Weights for this coin are scarce, perhaps the most plentiful being knobbed weights for use with folding balances or scales in japanned tin boxes. But there are a couple of scarce types of 'loose' weights for the seven-shilling piece, and one of them is shown in Fig 20.

It is, broadly speaking, correct to say that the production of guinea weights ceased around the turn of the 18th century. The next, and final, period of coin-weight production in England will be the subject of the concluding article in this series.

CLASSIFICATION

All the weights covered in Part 7 may be assigned to a single group. In many cases it is impossible to decide with which phase of the recoinage a given weight should be associated, and for that reason the division into subgroups is based largely on design features.

GROUP I	Weights for guineas and fractions issued from 1773 to about 1800.
Subgroup I1	Portrait types for both standards.
Subgroup I2	Types referring to the 1771/2 division.
Subgroup I3	Other types in 'sets' for both standards.
Subgroup I4	Types referring to the New Standard, and/or dated 1775/6/7
Subgroup I5	Other types for the New Standard.
Subgroup I6	Miscellaneous types, including weights for pre-1760 guineas and third-guineas.
Subgroup I7	Knobbed weights and other special weights from fitted scale boxes.

REFERENCES

References 1 - 4 are in Part 1; 5 - 10 in Part 3; 11 - 19 in Part 4; 20 - 24 in Part 5; 25 - 27 in Part 6; and 28 - 31 in Part 7.

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35 DYER G.P.: The Office of Stamper of Money Weights 1774-1870' Libra Vol.5, 20-21, 29-30; Vol.6, 6-7, 12-13, 24-25.

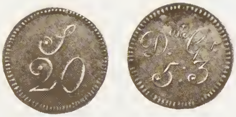
36 STOCKS Ronald: 'Guinea Weights - Part 2' Equilibrium pp.495-504.

37 TAYLOR E.G.R.: 'The Mathematical Practitioners of Hanoverian England 1714-1840' Cambridge U.P. 1966.

ILLUSTRATIONS

Note: Weights from this period are usually accurate and no useful purpose is served by recording the weight of each specimen.

1. Obv. S 20. Rev. Dwt.Gr. 5:3. 20mm, c.1774. For a guinea coined before 1760.
2. Obv. GEORGIUS III·DEI·GRA· around portrait of George III, KIRK·F· below. Rev. DWT. GRA. 5 8, stamped ewer. 25mm, c.1774. For guinea, 128gr standard.
3. Obv. as No.2 but plainer work, no signature. Rev. Dwt. Gr. 5 8 surmounted by crown with border of leafy stems, stamped ewer. 24mm, c.1774. For a guinea, 128 gr standard.
4. Obv. as No.3. Rev. as No 2 but 5 6 instead of 5 8. 24mm, c.1774. For a guinea, 126 gr standard.
5. Obv. COINED BEFORE 1772. Rev. Dwt. Gr. 5 6, scrolls above and below. 19mm, c.1774. For a guinea coined before 1772.
6. Obv. COINED SINCE 1772. Rev. G R, crown between, III below, Dwt. Gr. 5 8, stamped ewer. 19mm, c.1774. For a guinea coined since 1772.
7. Obv. GEO III UP TO THE 1st of JAN^{y} 1772. Rev. S D 20 6 or Dw^{t} Gr 5:6. 20mm, c.1774. For a guinea coined 1760 - 1771.
8. Obv. PRIOR TO 1772. Rev. Dw^{t}. Gr. 5:6, stamped ewer. 21mm, c.1774. For a guinea coined before 1772.
9. Obv P.^{wt}. G.^{r} 2·14 HALF GUINEA. Rev. blank. 17mm x 12mm. c.1774. For a half-guinea, 62 gr standard.
10. Obv. P.^{w}.G.^{r} 5:8 GUINEA, stamped anchor. Rev. blank. 21mm, c.177m. For a guinea, 128 gr standard.
11. Obv. GEORGIUS III DEI GRA around portrait of George III, PHILLIPS in small letters below. Rev. GUINEA WT 1775, stamped crown. 21mm, c.1775. For a guinea, 128 gr stamdard.
12. Obv. GEORGIUS·III·DEI·GRA· around portrait of George III. Rev. HALF·GUINEA·WT. 1775, GRICE, stamped crown. 18mm, c.1775. For a half-guinea, 64 gr standard.
13. Obv. STAND.^{d} GUINEA, stamped crown. Rev. By Act of Parliament 1775, in script, incuse. 20mm, c.1775. For a guinea, 128 gr standard.
14. Obv. To The New Standard 1775. Rev. D G 5 8. 20mm, c.1775. For a guinea, 128 gr standard.
15. Obv. NEW STANDARD 1776. Rev. D G 5 8, raised crown in centre, stamped ewer. 21mm, c.1776. For a guinea, 128 gr standard.
16. Obv. 1 7 7 7. Rev. P G 2 16, stamped crown. 18mm, c.1777. For a half-guinea, 64 gr standard.
17. Obv. G R, large rose between, castle with three flags, ABDY below. Rev. STANDARD S 21, stamped crown. 19mm, c.1775. For a guinea, 128 gr standard.



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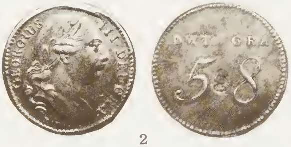

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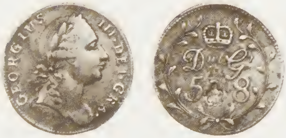

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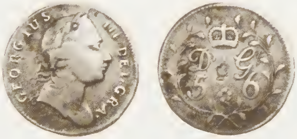

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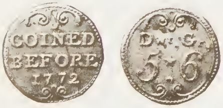

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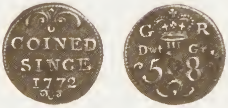

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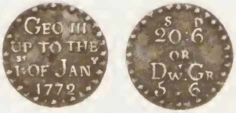

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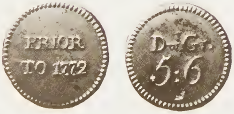

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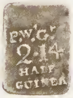

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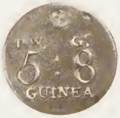

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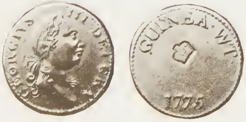

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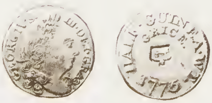

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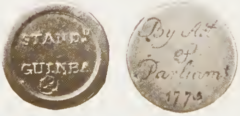

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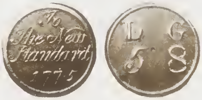

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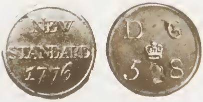

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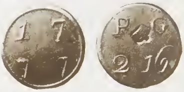

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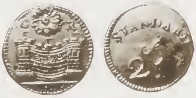

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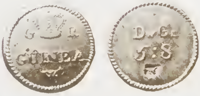

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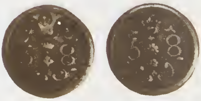

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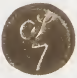

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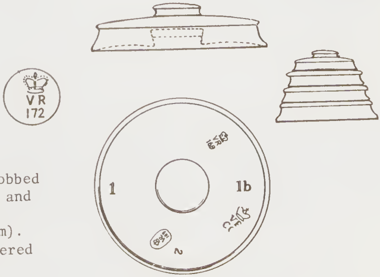
18. Obv. G R, large crown between, GUINEA W^{t}. Rev. Dw Gr 5:8, stamped lion. 20mm, c.1775. For a guinea, 128 gr standard.

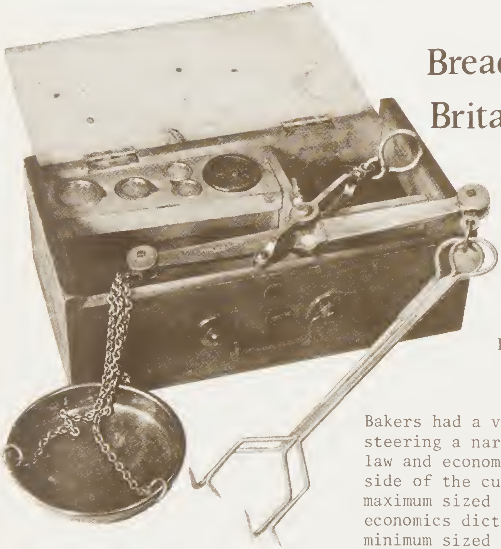
19. Obv. 5 8 with several decorations, stamped snchor. Rev. similar, but slightly different decorations. 20mm, c.1775. For a guinea, 128 gr Standard.

20. Obv. S 7 in script. Rev. same. 16mm, c.1800. for a third-guinea, coined 1797 - 1813.



Victorian stacking knobbed weights made of brass and marked W.Blews & Sons Warranted. (Birmingham). The design was registered in 1865.

Who'd be a Baker?



Bread-Weighing in Britain 1266-1926

Part 2

DIANA CRAWFORTH

Bakers had a very difficult life, steering a narrow course between the law and economics. The law was on the side of the customer who wanted the maximum sized loaf for his money, while economics dictated that bakers made the minimum sized loaf so that they could make a profit and stay in business.

The law allowed the Assizing of Bread or the Pricing of Bread, between 1757 and 1822. Assized bread was produced by the baker's adjusting the size of the loaf so that it always cost the same amount. Priced bread was produced by the baker's keeping the size of the loaf constant and adjusting the price when the cost of wheat changed.

In some areas, bakers still used the old-fashioned method of assizing bread, but by 1815, most towns reported that prices stayed more reasonable if Pricing was used, so the law was amended. After 1822, the London area had to Price bread, while Authorities in the rest of Britain could still choose whether bread was Assized or Priced in their area. After 1836, all bakers had to Price their bread, and at the same time, new weights were introduced. Bread was to be baked in 16 lb, 8 lb, 4 lb and 2 lb loaves. Naturally, a conservative public continued to ask for "pecks" or "quarterns", so a peck loaf now weighed 16 lb, instead of 17 lb 6 oz. This made life easy for inspectors, but the poor baker still had to allow for evaporation, so he weighed out 17 lb 2 oz of dough for his peck loaf that would sell at 16 lb weight.

FIG 1. Flat brass 2 lb weight by Avery Ltd, with 1½ oz of lead added to the base. Over-stamped 'Not for trade use. 1½ oz. Small ordinary bread' The weight of 33½ oz gave the baker the weight of dough for the 28 oz loaf. From 1946, bread was sold in units of 14 oz, 28 oz, and 56 oz.

The newly appointed Weights and Measures Inspectors took over from the Ward Motes*, Market Inspectors and sundry other local checkers, but they no longer dragged erring bakers through the streets or destroyed their ovens. Instead, they were fined.

The public had a greater chance of checking, as the 1836 law stated that scales and weights must be available in every shop and on every horse-drawn cart where bread was sold, and that the baker must weigh each loaf, if requested to do so. This law was operative until 1926, when carts were exempted, and until 1964, when shops no longer had to weigh bread upon request.

The baker avoided the wrath of his customers by offering a little extra to allow for any possibility of light weight loaves - a normal occurrence when the bread had travelled on a cart on a summer's day from daybreak until perhaps four in the afternoon. A closer check was kept on his ingredients as laboratory analysis improved, and by 1867, local authorities gradually acknowledged that they should pay for sueing roguish bakers, instead of expecting the Inspector of Weights and Measures to bring a court case privately and pay any legal costs out of his own wages.

By the late 19th century, it was generally considered that the quality and weight of a loaf could be relied upon but bakers continued to be brought before the Courts for minor infringements of the law - not telling a customer the weight of a loaf; calling a slightly improved bread 'fancy' to avoid the Bread Act; not weighing a loaf in front of a servant when delivering a loaf; for selling flour to customers using a 3½ lb weight (that is, half-a-stone); using over-weight weights!

Ironically, although bread was generally reliable by the late 19th century, that is the very period when scales started to be manufactured specially to weigh bread. The earliest patent was taken out in 1885, and numerous different designs appeared during the next forty years - easy to identify, and very collectable. Bread scales were kept in all bread shops and carried on all bread vans.

It is obvious, from reading the court cases brought against bakers, that interpretation of the law was a major problem to bakers. Some authorities stated that even bread barrows and bread delivery bicycles were to carry bread scales, but other authorities believed that the law exonerated these small 'vehicles' from carrying scales.

Regularly, bakers who were attempting to comply with the law were accused of offences. For example, a baker put aside a mis-shapen loaf for his own use, but twelve hours later his brother-in-law sold it. The loaf was weighed and found to be slightly underweight and the baker was fined. In some areas, the authorities permitted the weighing of loaves to be done when they came out of the oven, but in other areas, bakers were fined because they did not weigh the loaf when the bread was sold. Peculiarly, it was not compulsory for the 2 lb loaf to weigh 2 lb, after 1822, but it was the law that it had to be weighed upon request and the weight declared at the time of sale. No mention is made as to what the customer could do about a light loaf - I expect he 'voted with his feet' and went to a baker who made heavier loaves!

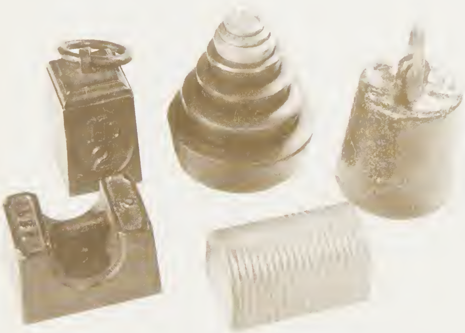


FIG 2. Nos. 1,2 & 4, iron weights supplied with bread scales. No.3 iron weight used by bakers to make up $3\frac{1}{2}$ lb bags of flour to sell. No.5 zinc alloy weight marked "This model is the exact weight of a dough piece for Procea under 10oz and Slimcea loaves". Still made, but now in plastic. The shape is that of the actual loaf.

Bakers' problems with Local Authorities really declined when the law which required the weighing of bread was repealed in 1964, and that law was repealed because bread was no longer the main food of any of the population of England. From an average intake of 1 lb of bread a day, it is down to about 2 oz a day now, with people more interested in flavour and variety, trying loaves with foreign recipes, and happily giving the birds a good part of their 'Staff of Life'. What a change over six centuries!

MAKERS/RETAILERS OF BREAD SCALES

Anderson Brothers, Glasgow
W.& T.Avery Ltd. Birmingham
F.Ballans, Grimsby
W.M.Barnes, Ashbourne
Bartlett & Son Ltd. Bristol
Carnegie & Layton Ltd. Birmingham
Cocksedge & Co. Ipswich
Cooperative Wholesale Society Ltd,
  Balloon St. Manchester
J.B.Daniels, Birmingham
Davis & Southerton Ltd. Walsall
Day & Millward, Birmingham
J.Hall & Son, Birmingham
Hunt & Co. Long Lane, London
E.Jackson, Leeds
G.& B.Morvan, Birmingham
Parnall & Sons Ltd. Bristol
Walter Parry, London
H.Pooley & Son Ltd. Birmingham
Geo. Salter & Co. West Bromwich
J.& J.Siddons, West Bromwich
United Yeast Co. Ld. Manchester
G.A.Wedderburn, Southampton
Whitehead & Honey, Leicester
A.R.Wood, Birmingham
Young, Son & Marlow, London

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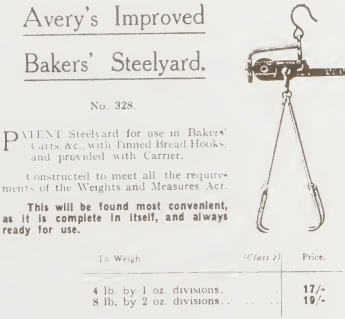
ACKNOWLEDGEMENTS

The author thanks John Knights and Raymond Malcolm for their kind help in supplying information towards the article.



Avery's Improved

Bakers' Steelyard.

No. 328.

PATENT Steelyard for use in Bakers' Carts, &c., with Tinned Bread Hooks, and provided with Carrier.

Constructed to meet all the requirements of the Weights and Measures Act.

This will be found most convenient, as it is complete in itself, and always ready for use.

To Weigh	(Class 2)	Price.
4 lb. by 1 oz. divisions.		**17/-**
8 lb. by 2 oz. divisions.		**19/-**

FIG 3. W.& T.Avery Ltd. Catalogue 1906. Steelyard constructed to meet the Regulations already published, but due to become law in the following year, 1907. It has a zero position to balance without a load.

STEELYARDS: 1907 Regulations

The instrument must balance without a load.
The graduations corresponding to equal differences in weight must be equal.
Proper counterpoises, sliding and moveable, must be used.
Steelyards shall be made of cast iron or steel.
The blade must be straight.

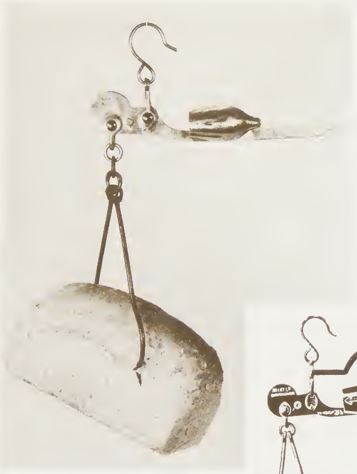


FIG 4. Avery Ltd. Class C. To Weigh 2 lb/4 lb. Blade 210mm (8¼") Brass. W.B.Avery's 1885 patent. This is the original version, which is unstable, has no zero position, and is made of brass, so would not meet the 1907 regulations.

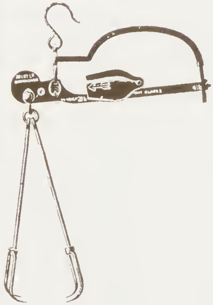


FIG 5

Patent Bakers' Steelyard.

No. 330. (Class 2.)

PATENT Steelyard, with Tinned Hooks, for use in Bakers' Carts. The Weight is hinged on to the Steelyard, so that it cannot be lost, and by simply turning it over on its hinge, the power of the Steelyard is altered from 4 lb. to 2 lb., or *vice versâ*.

If desired, can be fitted without extra charge with Cords and Wire Bread Scale or Chains and Wire Bread Scale.

Japanned	**12/-**
Polished	**14/-**
Brass	**18/-**

FIG 5. W.& T.Avery Ltd. Catalogue 1906. The second version had a nose-guard to improve stability. It still did not balance by itself, and the blade was not straight, so Avery made no claim that it would meet the Regulations. In fact, inspectors continued to test and stamp such steelyards until 1912, and allowed their use subsequently until they became inaccurate. The Avery Historical Museum own an example in a semi-circular tin box.

Figs 6 & 7. W.& T.Avery Ltd. Birmingham. Class 2 To Weigh 6 lb. Iron blade 250mm (9.8"). Hipkins' abridged patent specification of 1902 makes no mention of bread-weighing, but the illustration with the patent shows a loaf being weighed. The top bar was screwed to the top of the bread van pointing outwards. When the scale was required the relieving gear was released and the steelyard pulled out along its channel until it was sticking out of the van. The pan was released and turned down to the horizontal position and its catch fixed. Then the bread could be weighed in front of the customer.

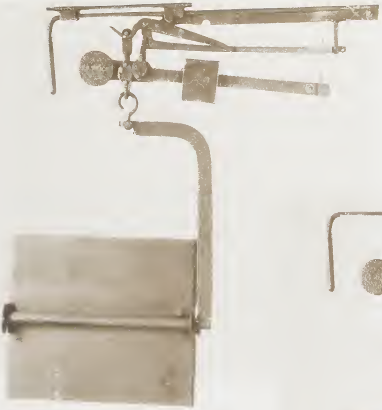


FIG 6

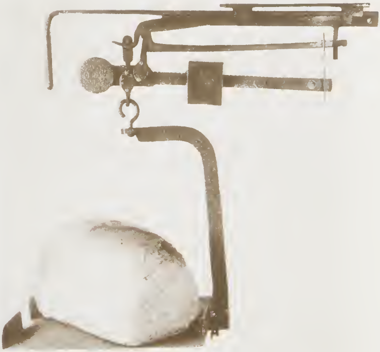


FIG 7

SPRING BALANCES: 1907 Regulations

Spring balances fitted with hooks or pans below the spring shall be permanently suspended from a stand, support or bracket, and if not so suspended shall not be stamped or restamped.

Spring balances with a 4 lb capacity must have intervals between consecutive graduations not exceeding 4 drams.

FIG 8. 24T Salter's Trade Spring Balance, British Made. To Weigh 4 lb by ¼ oz. Brass face 160mm dia (6.3"). Lead plug stamped GR (George V 1910-36) Salter knot trade mark. Identifiable as a bread scale by its 4 lb capacity and by the bread hooks.

FIG 9. Salter's Bread Balance 5 lb by ½ oz. Class II. Patent. Straight face 260mm long (9.8"). Lead plug stamped VR 658 (Victoria 1836-1901). Class I,II,III used between 1893 and 1907, but Victoria died in 1901, so this scale was made between 1893 and 1901. Unusual in having 5 lb capacity.

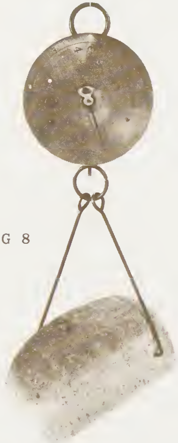


FIG 8

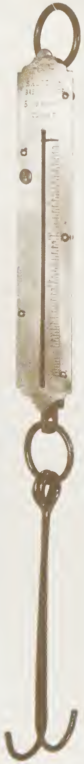


FIG 9

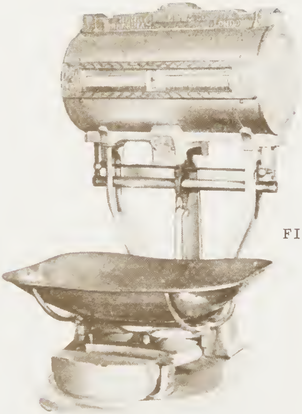


FIG 10

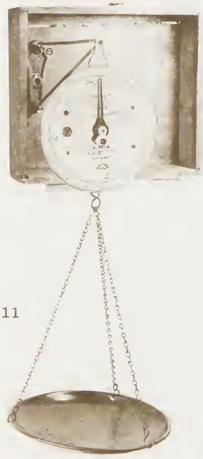


FIG 11

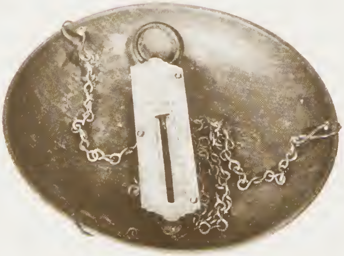


FIG 12

FIG 10. Dayton Royal Computing Scale. Two helical springs with rack and pinion to rotate the price-computing cylinder, and a roberval lever system to support the goods pan. Widely used to weigh fruit and meat, but commonly used to weigh bread in shops. This scale design was submitted to the Board of Trade for approval in 1907, and was made in Britain by Henry Pooley & Son.

FIG 11. No. 24T Salter's Trade Spring Balance To Weigh 4 lb by $\frac{1}{4}$ oz. British Made. Salter knot trade mark. Brass face 160mm dia (6.3"). Permanently attached to the bracket which folds into the box, so that it complies with the 1907 Regulations when the box is fixed to a van.

FIG 12. Salter's Pocket Bread Balance 4 lb + loz Class 2. Patent. Brass face 130mm long (5.1"), tinned pan. When the pan is loaded, the central rod pulls down and exposes the spring - not conducive to good maintenance. The balance is pocket-sized, but the pan is 185mm in dia (7.3").

EQUAL-ARM SCALES: 1907 Regulations

Every beam scale shall have the manufacturer's name and its capacity indelibly marked on it.

A scale with removable hooks shall not be stamped.

Beams which are 7 lb or under with swan-neck ends shall not be stamped.

Class C (applicable to bread scales).

On manufacture a 4 lb scale is to have a sensitiveness of 9 grains when fully loaded. The greatest error allowed by the verifier at the time of manufacture, either in excess or deficiency, when fully loaded, 12 grains.

On inspection a 4 lb scale is to have a sensitiveness of 27 grains when fully loaded, and the greatest error to be allowed by the inspector either in excess or deficiency, of a scale used for trade, when fully loaded, to be 24 grains.

FIG 13. Davis & Southerton Ltd Makers Walsall. To Weigh 4 lb Class C. Iron, black painted with gold decoration and rods. Beam 215mm long (8.5"). This beam is unusual in having finials on the box ends. The two hooks took 2 iron 2 lb ring weights, but there was no means of ascertaining the degree of deficiency (it is a go-no-go scale). The lead plug is under the bottom of the shears and was last stamped in 1926, the year that vans no longer had to carry a set of scales. It is surprising that the inspector allowed a go-no-go scale when they had been outlawed in 1907.

FIG 14. To Weigh 4 lb Class C. Brass twisted wire rods. Beam 220mm long (8.7"). Normally, bread scales had no finials at the beam ends. They were cheaper to buy in iron, rather than brass, so iron ones are more common. The lead plug is on the beam under the bottom of the shears and was last stamped ER (Edward VII 1901-1910).

FIG 13

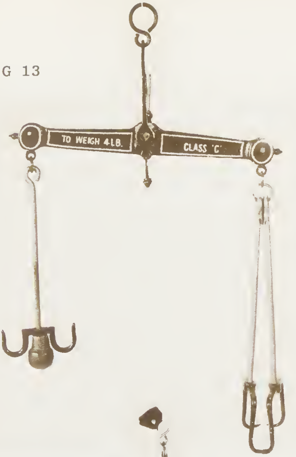
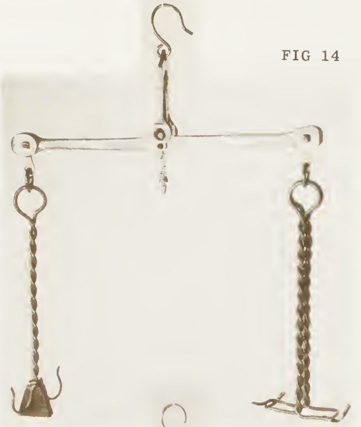


FIG 14



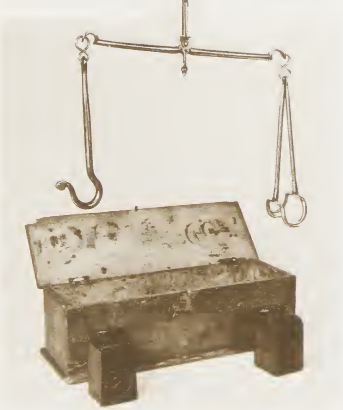


FIG 15

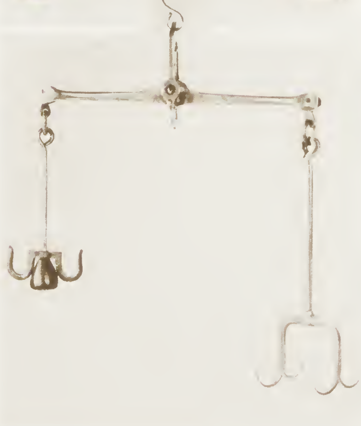


FIG 16

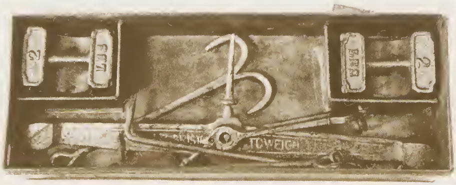


FIG 17

FIG 15. Class C 2 lbs. Beam stamped VR (Victoria 1836-1901). Steel in all parts, whitesmith wrought hooks. Beam 254mm long (10"). This very handsome scale has a superbly shaped hook on which to hang the two 2 lb ring weights. The beam looks original to the box and the weights each have a pen, yet the beam is only stamped for 2 lb capacity. This anomaly cannot be explained, unless the capacity was stamped on sometime after manufacture. The whole design looks much earlier than other bread scales the author has seen. It would fail to pass the inspector after 1907, having swan neck ends.

FIG 16. Avery Ltd. Class C. To Weigh 4 lb. Brass beam 230mm long (9"). The weight which balances the hooks is a very pleasant domed shape, but the hooks themselves are rather crude cast shapes.

FIG 17. Bartlett & Son Ltd, Bristol. To Weigh 4 lb Class 2. Beam 290mm long (11.4"). Iron enamelled black with red and gold decoration. Last stamped in 1903. The metal box is missing its lid.

FIG 18. No markings survive except Birm.... Iron beam 200mm long (7.9") Originally black enamel with red and gold decoration. Last stamped GR (George V 1910-36). Note the scissor tongs, sight-hole shears, Dutch beam ends, and the hanger for slotted weights. Small weights could be added to ascertain deficiency, so legal under 1907 regulations.

Fig 19. W.M.Barnes, Ashbourne. To Weigh 4 lb Class 2. Brass beam 280mm long (11"), Steel shears, hooks and weight holder. Last stamped in 1917. Very rare to have the name cast into the beam. Obviously made by Barnes and not bought in with the retailer's name painted on, as many others appear to have been, judging by their identical size and design.

FIG 20. W.&.T.Avery Ltd Birmingham. Patent. Class C. Iron beam black enamelled. Red and gold decoration. Beam 205mm long (8"). Note the balance ball, continuous knife-edges and brass pan for the weights.

FIG 21. United Yeast Co. Ld. Newcastle on Tyne. Class C To Weigh 4 lb. Iron beam black enamel, red and gold decoration. Scissor tongs. Note the unusual D-section rod used for the weight hooks.

FIG 22. Joseph & Jesse Siddons Limited, Westbromwich, Eng. Catalogue 1924. Note the Short hooks for weights and triple hooks.

FIG 23. DeGrave & Co. Catalogue c.1911. Still being sold with two 2 lb weights as standard. Also supplied with one 2 lb and a set of weights 1 lb to ¼ oz for 2 shillings extra. (They do not explain how the little weights could be attached to the hooks). Note the interesting weight hook.

FIG 24. W.& T.Avery Ltd. Catalogue 1906. Patent bread scales - the continuous knife edge being the patent idea. Claiming to meet all the W.& M. Regulations but not having enough weights to determine deficiency.

** *Nose guard; Sight-hole; continuous knife edge; shears; balance-ball...*
If you don't know these terms get ISASC's Handbook of Old Weighing Insts.

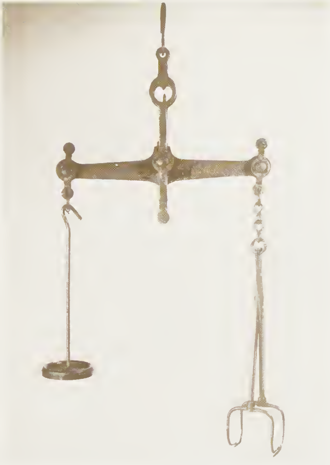


FIG 18

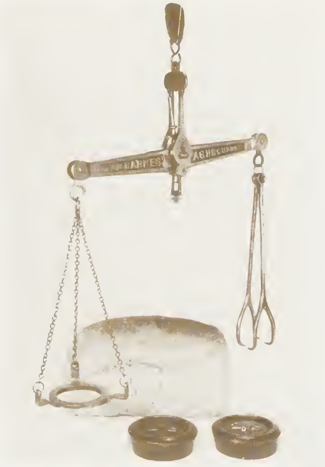


FIG 19

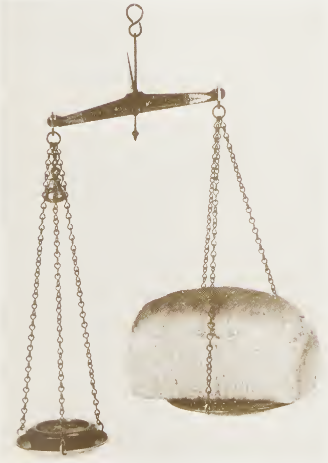


FIG 20

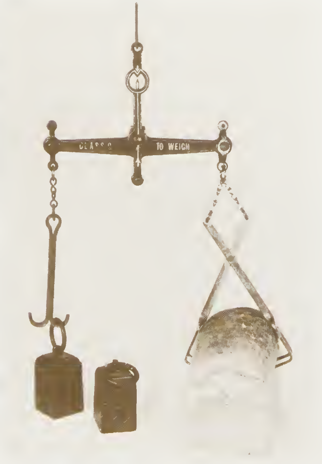


FIG 21

FIG 22

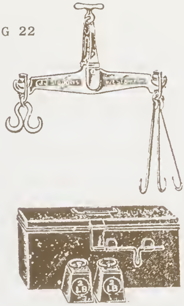


FIG 23

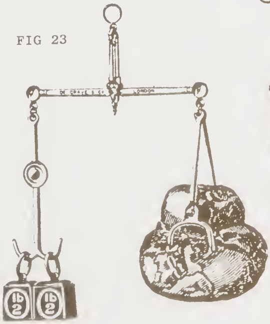
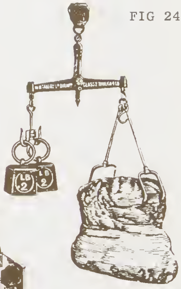
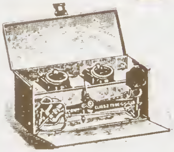
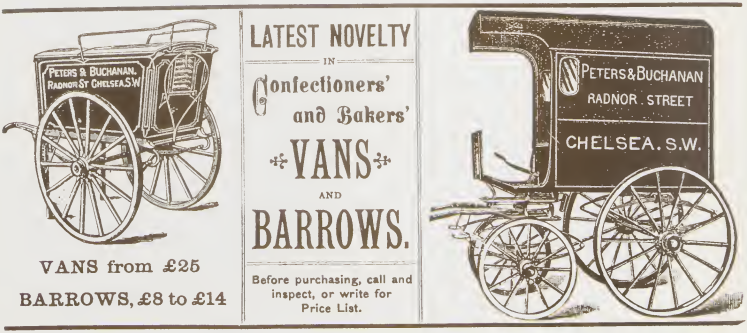


FIG 24





Edwardian Advertisement
for bakers' hand-carts
and horse-drawn vans.



LATEST NOVELTY

IN

Confectioners'
and Bakers'

VANS

AND

BARROWS.

Before purchasing, call and
inspect, or write for
Price List.

VANS from £25

BARROWS, £8 to £14

PETERS & BUCHANAN.
RADNOR ST CHELSEA S.W
PETERS & BUCHANAN
RADNOR . STREET
CHELSEA . S.W.

How I Started...

BOB HOLDAWAY

I suppose I was about ten years old when I realised that the large outhouse attached to my parents' house was full of interesting treasures just waiting to be discovered.

First and foremost was a large shallow brown earthenware sink complete with a tap and water supply. Garden tools galore, woodwork tools very quickly put out of bounds, two glue pots with slabs of toffee-like glue, and cans of paint cluttered the floor. There were an ex-army canvas wash basin complete with stand, together with a camp bed; an old cricket bag containing bats, pads, gloves and stumps; a huge square tent with wooden supports and a long shelf, which was erected every summer and occupied half the lawn; bicycles, an old mangle, a dolly tub and a host of bric-a-brac that can be found in any antique centre today.

But one large strong locked wooden box with handles at each end, and so heavy that it could not even be dragged along the floor, excited my curiosity. Eventually, my father, after repeated urgings, promised to open it, although he said I would be disappointed as it only contained old weights that grandpa had collected many years ago. Now grandpa, like so many Victorians, had been an avid collector. I had seen his wonderful collection of butterflies, picture postcards, and foreign stamps - but Weights!

The box was duly opened, and true, in the eyes of a young boy, it was a disappointment. Weights of all shapes and sizes together with what I later learned were spring balances and steelyards, abounded. So did rust, dust and cobwebs. A cursory glance was sufficient and my interest was soon diverted to a more realistic choice - cricket bats and balls.

The years passed - twenty-five in all. I was now Chief Inspector of Weights and Measures at Shrewsbury. On a visit to my parents home, my father, now retired, reminded me of the old box of weights and suggested that I took it with me. There it stood, as it had all those years ago, in the same position on the floor of the outhouse and just as immovable. This time, though, on opening the box, I saw its contents through different eyes.

Ignoring the accumulation of dirt and cobwebs, I found 3lb weights, pie weights, bronze George IV and William IV weights, nest weights, cased weights, and earthenware weights. There were small boxes of apothecaries' beam scales and folding and rocker type coin scales. Bread steelyards, Mancur balances and Quadrant spring balances were among a host of scales and weights of a more mundane character. What a treasure trove! I couldn't get back to Shrewbury quickly enough to clean and examine my heirloom.

Many of the weights had Devon markings, and it was apparent that grandpa, who had been the Weights and Measures Inspector for the Newton Abbot district of Devonshire for some thirty years, had fortunately collected and not destroyed, as happened in so many instances, those weights that had been made obsolete by legislation at the turn of the century.

How fortunate I was to acquire a valuable collection in this manner, and how wise my father was to hand it over when it could be properly appreciated. It was displayed in my office for twenty-five years and admired by many, including Tom Graham who featured some of the weights in his booklet 'Weights and Measures'. I occasionally added the odd specimen during my working life, but did not take up collecting seriously until some five years into retirement. My purpose, now nearly achieved, has been to bring the collection up to date, so that it represents a history of trading practice in the United Kingdom over a period of nearly two hundred years. I often wonder what grandpa would say if he could see the collection today, and what stories the weights and scales could tell if only they could speak.

Bob Holdaway paints a vivid picture of his lucky introduction to the joys of collecting. I'm sure many of our readers have equally interesting, and widely different stories about starting our hobby. Why not set down YOUR story and send it to me for inclusion in our new series HOW I STARTED...

Editor.

Showcase

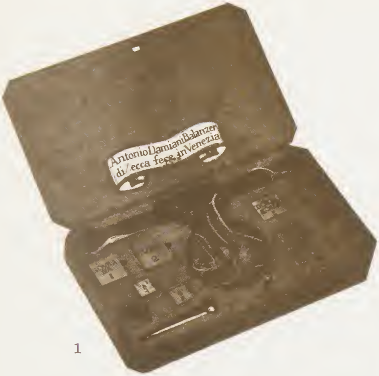
1. Coin scales by Antonio Damiani of Venice, scalemaker to the Mint. Mid 18th C. (?)
   Guido Zavattoni Collection
2. Set of Venetian weights 50, 20, 15, 10, 5, 3 zecchino. The largest is 35 x 35 x 22mm (1.4 x 1.4 x 0.6").
   Guido Zavattoni Collection
3. Set of 'Victoria' weights in an unusual rectangular stand (normally the stand is circular).
   Courtesy Royal Museum of Scotland
4. Diamond scales by Antonio Damiani of Venice, (see 1. above)
   Guido Zavattoni Collection
5. Roberval laboratory (?) scales by Henry Troemner of Philadelphia, USA.
   Gene Mahoney Collection

SHOWCASE SHOWCASE SHOWCASE SHOWCASE SHOWCASE SHOWCASE SHOWCASE

The SHOWCASE store is almost empty now - so please send me good clear photographs of scales or weights in your collection. They do not have to be rare or unusual, just good examples photographed well. It is best to send me 35mm black and white negatives with enprints. I can also use colour prints but the extra processing does reduce quality.

Editor

SHOWCASE



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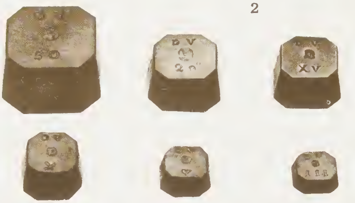

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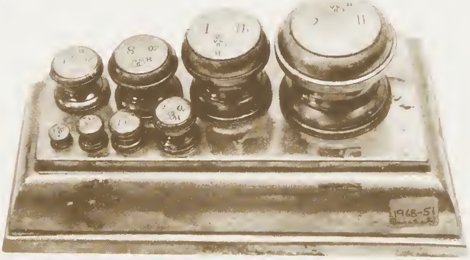

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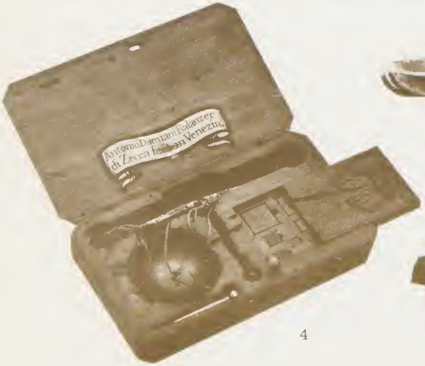

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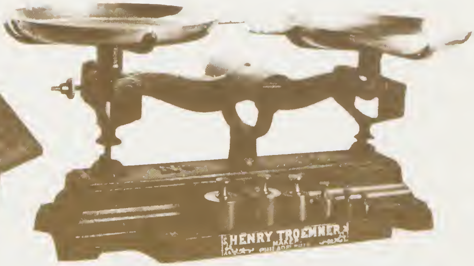


5

Notes & Queries

NQ 98 TOLA, ANNA AND RATTI — Note from Maurice Stevenson

The following is an extract from a letter written by the late Jack Bryant in 1963 when he was Superintendent of Weights & Measures in Kenya

In 1951, when our new Weights & Measures Bill was about to be read for a third time (in Parliament), I suddenly heard that the Asian community was going to press for the inclusion of their native denominations of weight in the Schedule which would list our lawful standards. I hurriedly gathered the facts..(listed below)..and went to the 'House' with them after the third reading had already commenced. My Minister was delighted with the evidence and, when the subject of RATTIs was raised by an Asian Member, he jumped up and produced the beans. I do not think that even the Asian Member realised, until that moment, that the 'RATTI' was a variable bean, for the subject was dropped like a hot ember, and no more was heard about Tolas, Annas and Rattis in the 'House'.

After writing the last paragraph, I sent an unknown face around to one or two Asian goldsmiths and, as I expected, he found a few 'rattis'. In case you have never seen them,... they are sometimes called "lucky beans" but as to whether or not it is these which are also 'jumping beans' I am not sure.

1. I have visited several jewellers shops including that of the President of their trade organisation, and also the shop of the leading Asian jeweller.
2. As a result of conversations with these several jewellers, the following additional points have been revealed:
    - a) A 'RATTI' is not a weight but is a bean which is used as a weight. I attach samples which indicate that the Ratti is not a standard as there is a tremendous variation even between these three samples.
    - b) 6 Rattis or beans = 1 Anna
    - c) The ANNA is the Indian coin and this is cut into a half and quarters to provide the ½ Anna and ¼ Anna.
    - d) 96 Rattis or beans = 1 Tola.
    - e) 1 Tola is presumed to equal the Indian Rupee coin.
    - f) Each Asian jeweller that I visited possessed the Troy weight series of denominations as well as their 'Tola series'.
    - g) I was told that for conversion they use the formula: 1 oz Troy = 2 Tolas 64 Rattis. i.e. they assume 1 Tola = 180 grains.

SUMMARY

1) The Tola and Anna are derived from the variable Ratti, which is a bean.
2) Most Asian Jewellers already have the Ounce Troy in use.
3) They know how to convert one series to another.
4) The largest Ratti bean attached here weighs 2.3 grains, and the smallest weighs 1.5 grains - a variation of 0.8 grain.
5) The jewellers say 6 Rattis equal 1 Anna. From the finding under 4) above, the Anna could be either 13.8 grains or 9 grains, or a variation of over 50% on the latter.
6) The Troy weight series and the Avoirdupois series allow jewellers to weigh their extremely valuable commodities accurately to within 0.0005 gn.

NQ 99 YARN BALANCE BY CASARTELLI

Query from Lewis Weiss

Recently, we acquired a yarn balance similar to the one on page 340 of EQUILIBRIUM, and on the box it has the following: UNIVERSAL YARN ASSORTING BALANCE. J. Casartelli & Son, 43 Market Street, Manchester. From Tod Carley, I was able to obtain directions for a very similar scale published by Geo. Thomas & Co. Ltd. Manchester. Do you have any information about Casartelli or Thomas? Geo. Thomas claims to be the original patentees, makers and proprietors. Who invented this type of balance, when and where?

REPLY

from the Editor

Joseph Casartelli was in business as an optical and scientific instrument maker of 43 Market St, Manchester, in trade directories 1851 - 1891; in 1892, the firm became Joseph Casartelli & Son. In 1923, they moved to 18 Brown St, Manchester and became Joseph Casartelli & Son Ltd. I am enclosing an electrostatic copy of the instructions for their yarn balance.

This type of balance, with a fine wire beam, was invented by Emil Staub in Germany, and patented, on his behalf, in England (No.6703 19 May 1886). George Thomas seems to have had a licence to manufacture the balance in England, and later took out his own patents for improved versions. It is not clear whether his competitors Casartelli, and Nesbitt, who sold/made identical balances, actually manufactured them, or merely retailed them. An article on yarn balances is planned for a future issue of EQUILIBRIUM.

NQ 100 WILLIAM ARCHDALL

Query from Gene Mahoney

I recently found a beautiful set of money scales... In deference to your time in answering questions, I've read all the EQUILIBRIUMs, and gone through Sheppard & Musham's book, and the Malter and Sotheby catalogues, and Houben's book, but found nothing about the set. There are references to weights made by this maker. Apparently silverfish had gotten to the label... However, I was able to pick out Willia____ Darby Sq_____. In Sheppard & Musham I found references to William Archdall, Dublin, and

Henry Archdall, Darby Square, Werburgh Street, Dublin. The weights in my box are dated 1737, and are of the described Irish Standard. The scale pans have the touch mark, incuse in the centre, crown over SD. The label refers to French Louis d'or of the new species, New Gold coins of Portugal. Can you tell me anything about the set?

REPLY from the Editor

Your Archdall set is very rare, and the only example I have heard of. Henry Archdall was listed in trade directories as a maker of gold weights and 'Inspector for the Trustees of the Linen Manufacture' from 1750 - 1765. at Darby Square, Werburgh St, Dublin. William Archdall, his predecessor (his father?) was working 1736 - 1750. I have no record of the mastersign SD, and no obvious candidate, yet. The unusually large size and layout, combined with the only known label for William Archdall, make this a most important set for its historical evidence.

Contemporary Comment

From Boston Selectmen's Minute Book 1754 - 1763. Sent in by GENE MAHONEY

British laws applied to British Colonies, so Colonial bakers laboured under the same restrictions as their British counterparts:

Boston, August 1732. The price of Wheat to be 10 shillings per bushel, and 3 shillings allowed for charge and expenses, so -

a penny white loaf to weigh 3 oz 9 drams
a penny wheaten loaf " 5 6
a penny household " 7 3
six penny wheaten " 2 lb 0 oz 1 dram.

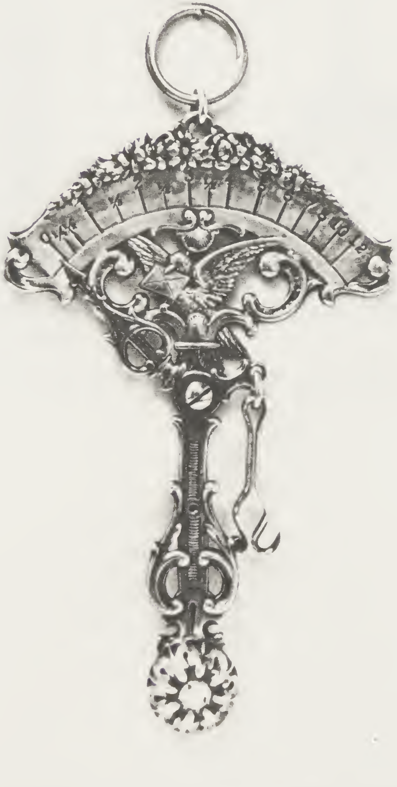
and the Clerks of the Market to make allowance for Bisket well Baked; three quarters of an ounce for each Bisket.

Boston, January 28th, 1754. Ordered that the Town Clerk post up an Assize of Bread at the rate of five shillings per Bushell for Wheat, and four pence per Bushell is allowed to the Bakers for their Charges Pains and Livelihood, which is computed as follows Viz^{t}.

of Penny White Loaf		8 oz	11 dram
Wheaten		13	½
Household	1 lb	1	6
Two penny White Loaf	1	1	6
Wheaten	1	10	1
Household	2	2	12
Six penny Wheaten Loaf	4	14	3
Household	6	8	4
Twelve penny Wheaten Loaf	9	12	6
Household	13	0	8

Rare & Interesting Pieces

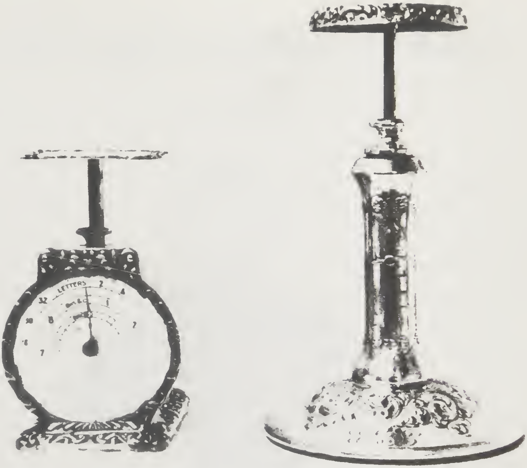
by
Diana Cramer



Sterling postal scale, Gorham, 1891, 6 1/2" high. Carrier pigeon with letter in beak beneath arched scale with border of flowers. *-photos by author.*

No self respecting person could allow his desk to be without a silver postal scale. The one with a ring for hanging was probably designed to be hung on the wall as it is too heavy for use on a chatelaine. The carrier pigeon with a letter in its beak adds an interesting decorative touch as well as indicating the purpose of the item. Its scale is in grams and is surprisingly accurate. Slide the letter in the clip or hang the package on the hook and the pendulum swings up to the proper weight.

The Gorham scale made in the more familiar style is a good example of a design that has stood the test of time. Modern desk top postal scales still operate on the same principles.



Sterling postal scales: left, Gorham coded 1900, 3 1/4″ high; right, Simons Bros., 4 3/4″ high.

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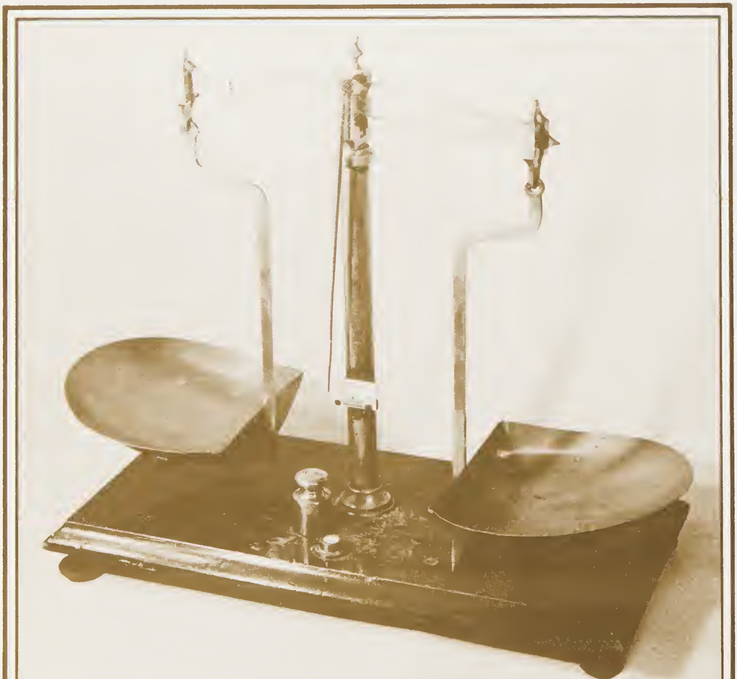
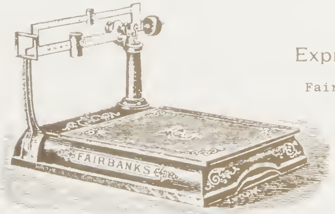


Cover Picture

This sensitive balance with its unusual shovel-shaped pans, was made to order for weighing bakelite milk tokens (jetons), ration coupons, or coins, and was used in offices or banks. Identical pans were provided so that the user could weigh 'like against like'. e.g. Fifty tokens would be counted into one pan, and then further, identical, tokens would be poured into the opposite pan. When the beam balanced, another fifty tokens had been 'counted' by weight. Although the index plate is marked CWS SCALES DEPt. BIRMINGHAM, the balance is believed to have been made under contract, probably by Osterlich Ltd, London, around 1940. The metal-work is all brass, mounted on a mahogany base with adjustable screw feet and a circular spirit level.

Cover photograph and information courtesy John Lound.



Express Package Scale.

Fairbanks' Catalogue 1891.

DOUBLE BEAM. FULL CAPACITY ON BEAMS.

Capacity, 1 oz. to 35 lbs Platform, 10½ × 12 in

INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

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Associate Editor — Diana Crawforth

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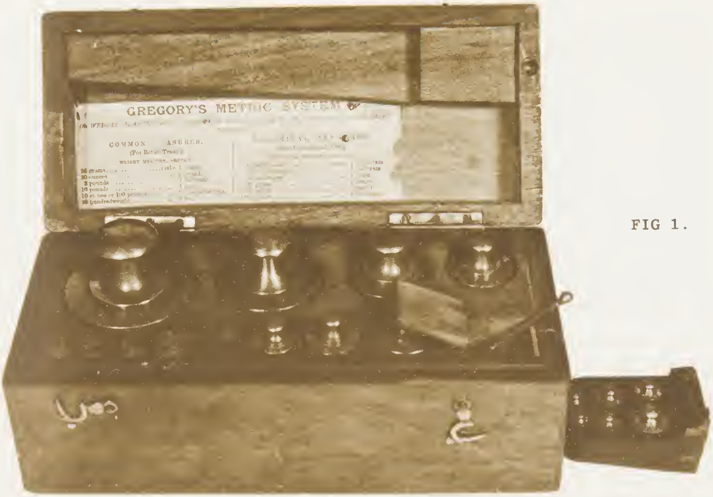


FIG 1.

Gregory's Imperialized Metric Weights

EXTRACTS FROM THE WORKS OF ISAAC GREGORY WITH COMMENTS BY MICHAEL CRAWFORTH

This box, which is labelled on the top GREGORY'S SYSTEM, contains weights of strange denomination, each weight being marked with both metric and imperial values: 1kg-2lb; 500g-1lb; 250g-½lb; 125g-¼lb; 100g-4oz; 50g-2oz; 25g-1oz; and (now missing), 25g-1oz; 12.5g-½oz; 6¼g-¼oz; 6¼g-¼oz; 3 1/8g-1/8oz. In the right front corner there is a small locker with a hinged lid, now empty, but presumably for a set of fractional metric weights. On the right side of the box there is a small drawer, labelled FRENCH SUPPLEMENT, which contains normal metric weights: 20g; 10g; 10g; 5g; 2g; 2g. The drawer is prevented from falling out by a knobbed brass rod which is pushed down a hole in the box to engage in the top of the drawer, in the manner of Dutch coin scale boxes. Inside the lid of the box the paper label is headed GREGORY'S METRIC SYSTEM and it refers to a publication by Gregory. Below, are two table of units, that on the left is titled'COMMON MEASURES (For Retail Trade)', and on the right, 'TECHNICAL MEASURES (For Professional Use)'.

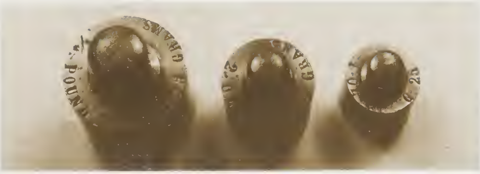


FIG 2.

The author was lucky to find this rare and extraordinary box of weights, and, prompted by the references to Gregory's publication, decided to investigate its history.

Isaac Gregory was a Fellow of the Royal Geographical Society, Principal of Merchant's College, London, and author of several works on diverse subjects; the war in Italy; silver coins; debased money of India; tables of equivalents for prices, money, weights and measures; and the metric system. Gregory had taught the use of the metric system for many years before 1873, when the following works were published: *Gregory's British Metric System* with its supplement, *Gregory's British Metric Arithmetic*. In both of these works he proposed the adoption by Britain of a system of weights and measures based on the metric system, but adapted to approximate the old imperial system. He drew attention to the complex diversity of the old system:-

> *The Committee of the House of Commons, 1862, reported that there existed in use in this Country ten systems of Weights and Measures, and as a specimen of the diversity there were 33 measures for land, 61 different measures for sale of wheat, 13 for oats, 16 for barley 9 for potatoes, 9 differing pounds weight for butter varying from 16oz to 24oz in the pound, 14 different weights called stones, 4 weights for flour, 9 for coals, 9 for flax and wool, 6 for hay and straw. In addition to these, in 1820, Dr.Thomas Young collected for the Committee of Weights and Measures, "a list of 154 weights and measures not known to the law, existing in different parts of the country, by which people bought and sold."*

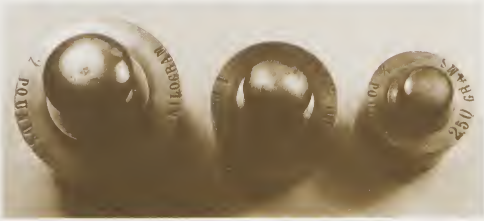
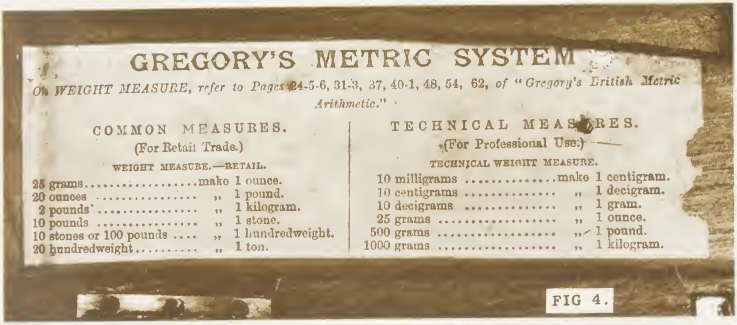


FIG 3.



GREGORY'S METRIC SYSTEM

On WEIGHT MEASURE, refer to Pages 24-5-6, 31-3, 37, 40-1, 48, 54, 62, of "Gregory's British Metric Arithmetic."

COMMON MEASURES.

(For Retail Trade.)

WEIGHT MEASURE.—RETAIL.

25 grams.................	make	1 ounce.
20 ounces	,,	1 pound.
2 pounds	,,	1 kilogram.
10 pounds	,,	1 stone.
10 stones or 100 pounds	,,	1 hundredweight.
20 hundredweight..........	,,	1 ton.

TECHNICAL MEASURES.

(For Professional Use.)

TECHNICAL WEIGHT MEASURE.

10 milligrams	make	1 centigram.
10 centigrams	,,	1 decigram.
10 decigrams	,,	1 gram.
25 grams	,,	1 ounce.
500 grams	,,	1 pound.
1000 grams	,,	1 kilogram.

FIG 4.

In another part of his work, Gregory recognized the advantages of the metric system, but went on to discuss the inherent disadvantages and the difficulty of getting the public to change to a different system. Many of these disadvantages, he claimed, could be avoided by using his imperialised metric system:-

> *The base and general principles of the metric system are, beyond argument or denial, the best devised for international purposes. Even should the truth of this assertion not be admitted, certain it is that it has become the most general system among commercial nations.*
>
> *The kilogram is the worst unit in the whole system. It is the kilogram chiefly which caused so much trouble in France, and made people so averse to the new weight measures. In all countries using the metric system it remains comparatively unused by the people. In commerce it is, and must be, used in the decimal system, but for retail purposes it is everywhere beaten by the demi-kilogram, or livre. In all cities and towns of France retail prices are quoted by the livre, not by the kilogram. In Switzerland, the people not only invariably use the livre, but use its half and quarter; but the stringency of the law in France prevents the use of the half and quarter livres. Retail weights in France are therefore given in livres and grams.*
>
> *The kilogram is too large a retail unit; the pound has supplanted the kilogram in all metric countries; but as the 500 grams making the 'pound' are neither decimal nor centesimals of the pound, but are arithmetically related to the kilogram, whose price is not even quoted, no human being can mentally calculate the value of his meat-food purchases, although the weight and unit of price may be both correctly given. No meat, bacon, fish, cheese, butter, etc, which are cut from bulk, and therefore of uncertain value until weighed, can be calculated mentally by one purchaser in a thousand in France. The French are notoriously bad mental calculators.*

> *Careless and uninformed persons have fallen into the habit of calling the French metric system 'decimal'; it is only theoretically, not practically decimal. It is, in fact, and in quotation, centesimal in money, and millesimal in weight, lineal, square and cubic measure.* (i.e. kilograms are divided into thousands).

Gregory wrote on and on for many pages, covering the advantages and disadvantages of all the various measures used for all purposes, much of it in the question- and -answer tutorial form favoured in previous centuries. Eventually, he got round to promoting his ideas for a modification of the metric system for use in Britain:-

> *The whole of the weights and measures in our imperial system may be assimilated to and made equal with metric measures; and the improved system would work as smoothly as our present one in a very short time. If we resolve to metricise our own measures, we shall make as much progress in the metric system in five years as the French have made in fifty. After many years experience in teaching the metric system, the author is persuaded that to metricise our own weights and measures will be the easiest and best course.*
>
> *By using my proposed Weight Measure, the most important of all national measures, you see that a poor person may buy and calculate her ounces of tea and coffee, her pounds and ounces of beef and bacon, not only without decimals, but more easily than at present by the imperial system, while the merchant can use decimals if he chooses. The chief improvements as to numbers in my proposed weight measure are that 20 ounces are proposed for 1 pound, instead of 16; 10 lbs to a stone, instead of 14; 100 lbs per hundredweight, instead of 112, Etc.* (N.B. Imperial oz = 28.35g. Gregory's Metric oz = 25g).

PROPOSED SET OF METRIC WEIGHTS.

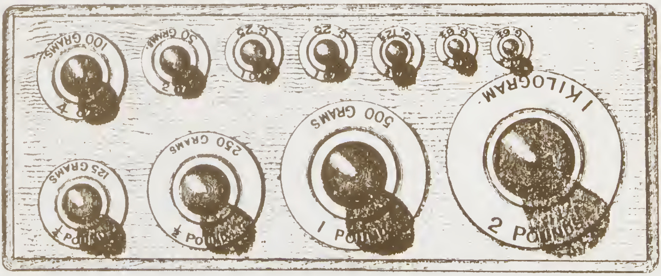


FIG 5. BOX BRASS WEIGHTS

> *In our complex industrial condition, in which most men are either merchants, manufacturers, warehousemen, or craftsmen, we cannot, without very serious difficulty, abandon old known names which are mental standards of weights and measures. Our imperial measures need only be adjusted (not changed in name) to represent metric quantities. The difficulties attending an assimilation of the British system to the metric are not serious, though they may be exaggerated by persons who know very little or nothing about the metric system. However, the maximum of difficulty will be to adopt the metric system pure and simple, along with its nomenclature. The minimum will be to metricise our own measures. By metricising our own weights and measures, still retaining our old names, every man woman amd child may use the metric system without any new instructions whatever, and even without knowing that he is using the metric system in any way.*
>
> *The priciple feature is, that we metricise our old measures and keep the old names for home and retail use. For wholesale and international trade, we change yard to metre, quart to litre, and introduce the hectolitre and kilogram. None of our present scales and weighing machines would, of course, require any change, but weights only* (would need changing). *Articles sold by the present ounce, pint and quart will still be sold under the same names, at one-eighth less in price for an equivalent one-eighth less in measure.*

Here, Gregory went on to propose a suitable notice informing tradesmen of the change to his new system:-

> *Mr.Butcher, on and after January 1st next, your pound, half-pound and quarter-pound weights will be one tenth heavier than your present weights bearing these names, and will contain respectively, 500, 250 and 125 grams of legal metric weight; which quantities represent 20, 10 and 5 metric ounces, respectively; each ounce will be of 25 grams of legal metric weight and will be one eighth less in weight than the old ounces. Weights may be obtained from....Etc.*

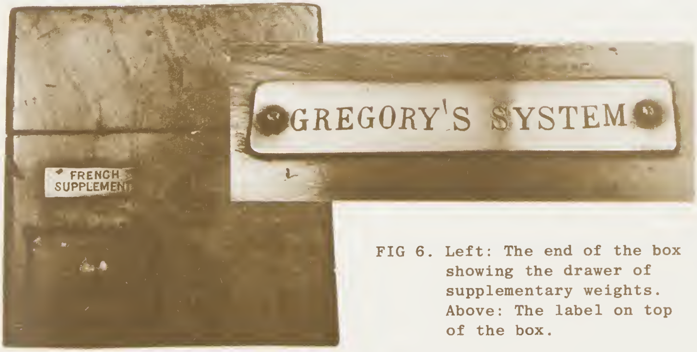


FIG 6. Left: The end of the box showing the drawer of supplementary weights. Above: The label on top of the box.

Gregory presented many lists and tables showing his imperialised metric units for weights and measures of all kinds, weight, linear measure, and cubic measure for all trades and other purposes. In an appendix he provided drawings of the instruments he proposed, including a box of weights, Fig 5, which did not include the 3 1/8g-1/8oz weight, or the locker included in the set shown in Fig 1. The weight system he proposed was as follows:-

6¼ grams = ¼ ounce*
12 " = ½ "
25 " = 1 " *
50 " = 2 "
100 " = 4 "
125 " = 5 "
250 " = 10 "
500 " = 1 pound

1 kilogram = 2 pounds
2 " = 4 "
5 " = 10 " = 1 stone
1 centner = 10 stones = 1 cwt.
1 quintal = 2 cwt
1 ton = 20 "

* A set of weights was to include 2 each of these denominations.

To promote his new system, Gregory wrote to several important people, including the President of the Board of Trade, which body was responsible for weights and measures, and to key figures in industry, like the Chief Engineer of the Bowling Iron Company. The replies he received (at any rate, those he published !) were cautiously favourable:-

> *The President is of the opinion that it would be desirable for you to publish your book, and plan, and put it to the test of public opinion.*
>
> *Office of the Board of Trade.*

> *Your British Metric System seems to me to extract all the virtues of the French metric system, without its vices, and embodies them in a perfectly available English form.*
>
> *Chief Engineer, Bowling Iron Company.*

Looking back at Gregory's proposals, it is now easy to see that his system was an uncomfortable compromise, pandering to short-term convenience and conservatism of the public. In reality, his units were neither one thing nor the other, and he carefully avoided reference to the clumsy values below 25g-1oz. His comment that no scales would be affected, completely ignored the many steelyards and spring balances then in use for retail purposes, all of which would have been obsolete. The general public would have found their letter scales useless, too. Would housewives really not have noticed any difference when their recipes were made from a pound which was a tenth heavier and an ounce which was an eighth lighter ? Would the retailer have been happy buying in proper metric units and then having to sell in Gregory's units ? Gregory seems to have missed the whole point of adopting the metric system, which was to achieve a universally known system with identical units and nomenclature.

The existence of a box of Gregory's weights, Fig 1, is a surprise and something of a mystery, because the system was never adopted, or officially recognized, and would have been illegal if used, as he proposed, for retail purposes. When Gregory wrote to eminent authorities to promote his system, he included with his letter, a sample of his imperialised metric rule, which apparently met with some approval. Is it possible that he also had made a few sets of weights for the same promotional purpose ?

American Patent Models

GRAHAM FORSDYKE

Illustrations courtesy of the Smithsonian Institution.
Photographs by Bill Doniger

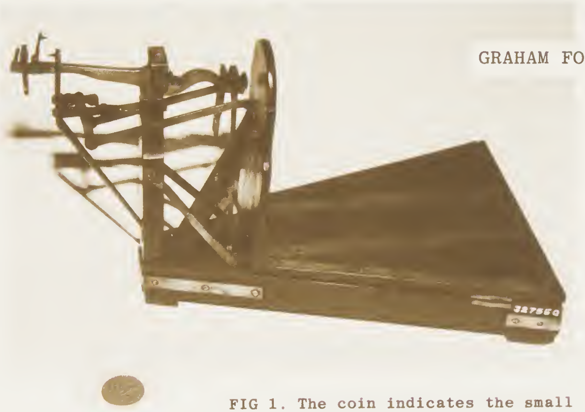


FIG 1. **The coin indicates the small size of this wood and metal decimal scale model.**

We all get tired of government red tape from time to time, but one aspect of American legislation which has proved a goldmine of information for collectors and researchers was the idea of patent models. Back in 1780, when the American patents office was opened, the administrators of the day insisted on a working miniature model of every patent application.

Clearly, from the start, the new patent office hadn't given sufficient thought to the problem of storage, and the models were initially housed in a hotel named Blodgett's in Washington, which also housed the City's Post Office.

In 1814, with the hotel's shelves already groaning under the weight of models, the whole idea almost came to an abrupt end. The invading British troops who were sacking the town were about to burn the hotel and its contents to the ground, but relented following a personal appeal from the head of the patent office, a William Thornton, to the commander of the British forces. By 1823, there were over 1,800 models at Blodgett's, but then America went invention crazy and just thirteen years later, the inventory showed 10,000 models, and clearly, a new building was needed.

It was decided to re-organise the Post Office into what was to be known as the United States Patent Bureau, and a new system of indexing patents by number, rather than by the inventor's names, was introduced.

Whilst grounds were being broken for the new building, Blodgett's Hotel was accidentally burned to the ground just ten days before Christmas, destroying all Bureau records and every model. In 1840, the new Patent Bureau building was ready and was soon filled with new models to such an extent that in 1870, the law was changed to require models only when specifically requested by the Commissioner.

Again, fire hit patents history. In 1877, no less than 76,000 models were destroyed, but even so, the storage capacity of the Patent Bureau was being overcome, and in 1880, the law was again changed, and then effectively prohibited the submission of models, except for those claiming to be flying machines or those capable of perpetual motion.

Two official acts of vandalism were permitted in 1908. First, Congress decided to dispose of the accumulation of nearly 156,000 patent models. Secondly, and perhaps an even greater crime, the Smithsonian Institution, given the choice, selected only 1,061 models for their collections. The remainder were stuck into storage until 1925, when Congress again moved to dispose of the models. The entire collection was purchased by Sir Henry Wellcome, who was already assembling a vast collection of early medical equipment, and hoped to open a patent museum.

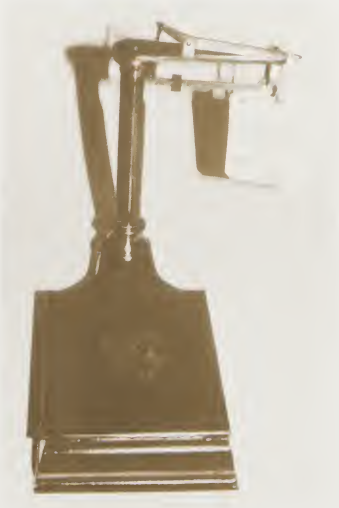


FIG 2. Fairbanks' model platform scale.

The models were moved to a warehouse in Tuckahoe, New York, but Sir Henry died, aged 82, in 1936, without realising his dream. Two years later, the trustees of the Wellcome estate sold the entire collection of models to a Broadway producer, Crosby Gaige, who, with his business syndicate, displayed a selection at the Rockerfeller Centre in New York City. Around 700 models were sold to the organisers of the New York World's Fair, and another 900 went to the University of Texas, at Austin. The World's Fair models were eventually purchased by Tunicliff Fox, and are now owned by the Hagley Foundation, Delaware.

The vast bulk of the collection remaining was then sold by the Gaige Syndicate to a group of business men calling themselves the American Patent Models Inc., who rented a floor at the Rockerfeller Centre to unpack, sort, and identify their purchases. Around 500 models went on show in various department stores across the country.

However, the syndicate's backers were running out of funds, and 3,500 cases of packed models were moved to a warehouse in New Rochelle, just before bankruptcy was declared, in 1941, and the entire collection was put up for auction. The historic sale was held in 1941, and developed into a battle between O.Rundle Gilbert, an auctioneer from Garrison, New York, and a junk dealer representing a Japanese scrap metal dealer. Gilbert paid a very reasonable $2,100 for the collection, but had also to put up 11,000 bucks in back-storage charges.

Now Gilbert found himself with something of a problem. To solve it, he sold off a few models which raised the funds for cataloguing the others. In 1943, just as the first 15,000 models had been unpacked and catalogued, a fire destroyed them all. Even six years later, in 1949, Gilbert had not even opened all the cases for they then suffered yet another fire which destroyed all but a few thousand boxes - a tragically small percentage of the seventy-five truckloads originally purchased.

One thousand models which had survived the fires were displayed in a barn museum in New Hampshire, and in 1952, these were moved to a new museum in an abandoned hospital in Plymouth, New Hampshire.

It wasn't until 1970, that the auctioneer finally despaired of achieving a permanent museum. He then offered the Smithsonian Institution the chance to buy all the remaining models, but this offer was declined because most crates were still unopened and the contents unknown. Gilbert then decided to dispose of the models piecemeal, by sale and auction. And it is from these sales in the early 1970s that most of the models in private hands today, have come. Fortunately, the directors of the Smithsonian Institution were far-seeing enough to select some of the more interesting models, although they did let many historical items go by.

Few scale patent models are known, but some are in the Smithsonian collection. Two examples have been used to illustrate this article.

NOTE: A recent increase in interest in patent models in America has spawned a whole new business with some very dubious items being offered as actual patent office models. It seems that some antique dealers will call anything that is a little quaint, small, or broken, a patent model, but conclusive proof can obviously be had by the existence of the original tag attached to the model when it was accepted by the Bureau, as shown in Fig 2.

This article has been slightly adapted from the original, which was compiled by Graham Forsdyke from an original by Dick Dickerson of California.
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Windmill Weights

ALBERT RANGELEY

Having read of the 3½ lb (quarter stone) iron ring weight bearing a five-sailed windmill and the date 1797, Fig 2 (first shown in EQM, p.582), I became mildly interested in who could have been the maker. But, when I obtained a similar iron ring weight of 7 lb, bearing a five-sailed windmill on one side and the name UNION MILL, BEVERLEY on the other, my curiosity was greatly increased, Fig 1.

Previously, I had seen two other 7 lb ring weights, in Whitby Museum, in the North Riding of Yorkshire, both bearing five-sailed windmills. The windmills depicted on the 3½ lb weight and those in Whitby Museum are remarkably similar (from the same mould ?) the sails being symmetrical. The sails on my weight, Fig 1, are not equally spaced, but this is, of course, due to artistic licence, as the mill could not operate in this fashion. This difference could indicate different makers, but it is more likely that a single maker was involved and that when a replacement was needed for a worn-out pattern, it was made by a different craftsman.

The verification stamps on the weights at Whitby are YNR 26 (Yorkshire North Riding, district 26), while the stamps on the weight for the Union Mill of Beverley are ERY punched into the top of the weight, and VR 527 99 stamped on the lead plug in the base (Victoria Regina, East Riding of Yorkshire, 1899).

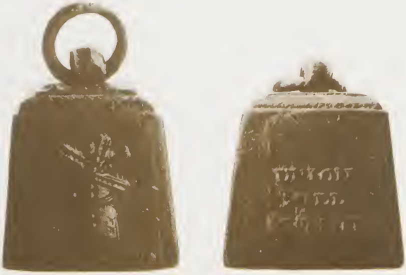
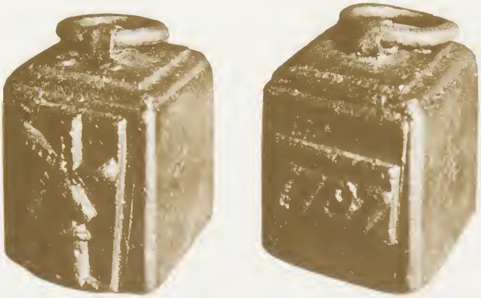


FIG 1. Windmill weight made for the Union Mill at Beverley.

FIG 2. Windmill weight dated 1797. For which mill was it made ?

Courtesy Graham Kendall.



It appears that these weights have never left their original 'home'. The 3½ lb weight was found in Aberford, in the old West Riding of Yorkshire, a village on the old A1 road from London.

It is unlikely that many such weights have survived, because the ring is set in lead on top of the weights, the lead being used for adjustment. New weights of this type were made illegal in 1907, although existing stamped weights were given a period of grace of twenty years before they were withdrawn either voluntarily, or by an inspector who obliterated the lead stamp with a punch of a six-pointed star design.

Intrigued by the design on these old weights, I decided to delve into their history. In 1799, at a time when flour prices were high and the poor 'had to preserve themselves from such additional expenses as may be imposed by the Monopolising Men', a meeting was held in Beverley in the old East Riding of Yorkshire. The people attending resolved to open a subscription and erect their own mill, the Union Mill, and subsequently, the foundation stone was laid down on July 31st, 1800. Although English mills normally had four sails, this new mill was to have five sails. Clearly, my weight was associated with this mill.

The 7 lb ring weights at Whitby Museum are attributed to the Mill at Whitby, also called the Union Mill. This too, had five sails and was built in 1800 for the same purpose as the mill at Beverley - the amelioration of the poor - and it subsequently had a client-membership of about nine hundred people (2). This mill no longer exists, but the mill tower at Beverley is now incorporated into the golf club house and can still be seen when driving through the racecourse at Westwood.

It is obvious that the weight dated 1797, Fig 2, could not refer to either of these two mills, and my investigation showed that almost all the five-sailed mills were built after 1800, and that they were mainly located in Yorkshire and Lincolnshire. Reference to the surviving records of both the Union Mill in Whitby, and the Union Mill in Beverly, revealed no hint as to the maker or supplier of the weights (1), although their accounts do indicate payment of fees for the stamping of the weights.

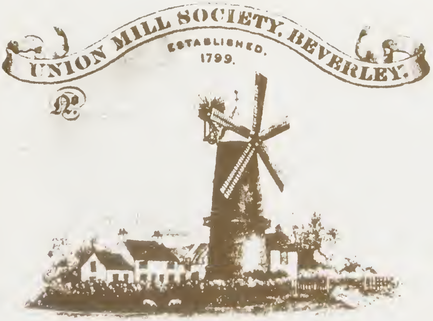


FIG 3. The Union Mill at Beverley.

Courtesy Beverley Library.

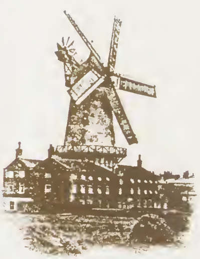


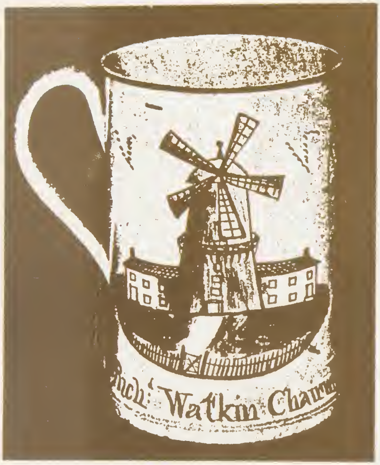
FIG 4. The Union Mill at Whitby.

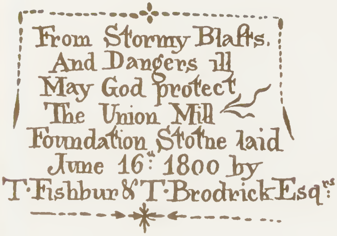
From Old Seaport of Whitby by R.T.Gaskin, 1909.

While the most common mill had four sails, some other mills had six or eight sails, but the question arises, when was the five-sailed mill introduced ? In the second half of the 18th century, John Smeaton (1724-1792), the celebrated engineer from Austhorpe, Leeds, in the county of Yorkshire, best known for his building of the Eddystone Lighthouse, designed the five-sailed mill. This design was reputed to be the most efficient of all multi-sailed mills, but its great disadvantage was that damage to one sail made the mill inoperative, due to the imbalance caused. Symmetrical mills could remain operational by removal of the sail opposite to the damaged one, which restored the balance (3).

Smeaton's papers in the library of the Royal Society include drawings of the five-sail arrangement dated 1758, and it was described in his report of 1774. One of the first five-sailed tower mills was constructed in 1782, to Smeaton's design, in Claremont Road, Newcastle on Tyne, and it was named the Chimney Mill (4). It is possible that the mill depicted on the 1797 weight was this mill, and that the date was when the weight was made.

Alternatively, it could be that, after 1782, weights bearing the five-sailed mill were produced in deference to Smeaton by an associate of his in the Lunar Society of Birmingham (5). In October 1782, James Watt invited John Smeaton to a meeting of the Lunar Society at his (Watt's) home, in order to obtain Smeaton's support for his steam engine. This eventually proved successful, as prior to this, Smeaton had pronounced against Watt's early engines as being too complicated. Boulton & Watt already made weights at their Soho Foundry in Birmingham (6), so it could be that Watt portrayed Smeaton's five-sailed windmill on weights destined for corn mills as as act of sycophancy.




From Stormy Blaſts.
And Dangers ill
May God protect
The Union Mill
Foundation Stone laid
June 16th 1800 by
T·Fishbur & T·Brodrick Esqrs

UNION MILL COMMEMORATIVE MUG
in Whitby Museum.

(with inscription taken from the opposite side of the mug.)

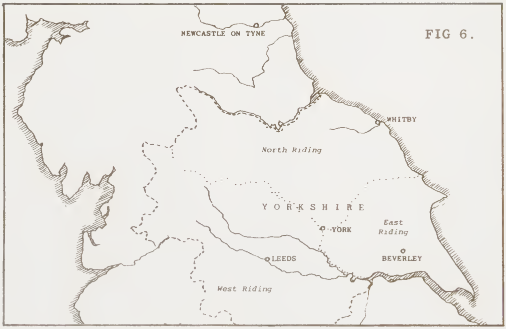
Courtesy Whitby Museum.

FIG 5.

John Smeaton was also consultant to the Carron Ironworks at Falkirk in Scotland, which led to his introducing cast iron, in preference to wood, for windmill and water mill machinery. This factory, too, was well known for its manufacture of cast iron weights. So perhaps the windmill weights were made there.

This still does not explain the date 1797 on the 3½ lb weight. Was it merely the date of manufacture, or did it represent something of greater significance ?

An enactment , dated 1797, in the reign of George III (10), which applied to the City of London, laid down strict rules for corn merchants and bakers. Bakers had to provide a sworn statement of meal and flour bought for the purpose of bread making. This statement had to be deposited at the Cocket Office by 11 am each Monday, on pain of severe penalties (8). To ascertain the amount of flour consumed in baking 'it shall be computed by the sack of 280 lb'. As weight was to be the arbiter, it could have been that large quantities of new weights were needed by the bakers in order to comply with this accurate statement, and that one of the weight makers used the windmill as an appropriate mark for the bakers' trade. (Incidentally, it was further enacted that the Wardmote Inquest of the City (9) could enter a baker's premises at all reasonable times to weigh loaves of bread exposed for sale). Although the date of this Act seems significant, it may simply be coincidence, as the 1797 weight almost certainly comes from Yorkshire where the Act did not apply.



Until we can unearth some documentary evidence, such as a maker's billhead or tradecard showing the windmill, or an account for the purchase of weights by the mills indicated, then it seems that we can only speculate on the name of the maker of these intriguing weights, and the significance of the date.

NOTES & REFERENCES

1. East Yorkshire Windmills; Roy Gregory (Chief Administrative Officer, Beverley District Council).
2. Whitby Museum Library.
3. WAILES Rex. English Windmills.
4. Newcastle on Tyne Library.
5. Lunar Society - a society of fourteen eminent men formed in 1765 and surviving until c.1798. The members included Josiah Wedgwood, Matthew Boulton, James Watt, Joseph Priestley, John Whitehurst. Associates included John Smeaton, Humphrey Davy and Benjamin Franklin (USA). They met on the Monday each month nearest to the full moon in order that they could return more safely by the light of the moon. The members were considered to be the harbingers of the Industrial Revolution.
6. Soho Foundry - this eventually became the manufactory of W.& T.Avery in 1895, and remains as their main factory today.
7. SCHOFIELD Robert E. The Lunar Society of Birmingham.
8. An office of the Custom House.
9. Equilibrium p.729.
10. Act: 37 George III Cap 98, 1797.

Letters

DRACHMS, DRAMS & BAR-WEIGHTS

Regarding the review of the Shire Album 44, Weights & Measures, I was pleased you gave it a favourable judgement, but surprised at the 'errors' you mentioned. For instance, the old spelling for apothecary weights was 'drachms', being derived from the Greek drachma. This continued in the 19th century after standardized spelling was adopted. In the 1854 edition of Woolhouse's Weights & Measures of All Nations, the spelling is drachms in both apothecary and avoirdupois series, but in the 1890 edition, the avoir spelling has been corrected to drams.

The two bar-weights shown on page 8 were not assigned to c.1800, as you state, but 'around 1800 to 1830'. I was confident of the one on the right being in that period and gave J.T.Graham the benefit of the doubt on the other.

Maurice Stevenson

REPLY

My point about drachm and dram is that they are alternative spellings for the same name - drachm from the Greek (as you say) and dram from the Middle-French. Before about 1890, there was no concept of differentiating between Troy/Apoth and Avoirdupois units by the form of spelling. This is illustrated by Woolhouse in the example you quote, and can be seen in contemporary dictionaries:-

Johnson's (?) Dictionary 1754. 'Drachm or Dram: the 16th part of an ounce Avoirdupois; with Apothecaries it is the 8th part of an ounce'

Bailey's Dicionary 1789, 'Dram, Drachm: the weight of 60 grains; in Apothecary weight 1/8 ounce; in Avoirdupois weight 1/16 ounce'

S.J.s Dictionary 1800, 'Dram: the 8th part of an ounce; in avoir the 16th part of an ounce.'

Imperial Dictionary 1850, 'Dram: among druggists an eighth part of an ounce; in Avoirdupois the sixteenth part of an ounce.'

So, it was personal choice as to which spelling was used. Thus, the 19th century weight makers' use of 'drams' for apothecary weights cannot be called an error. The later use of the different spelling to indicate Apoth or Avoir was a very useful development.

Editor

AUSTRIAN SOVEREIGN WEIGHTS

In reply to the question posed on EQM page 1070 in connection with weights marked 30, 20, 10 & 5 SOV(EREINS) (not the English spelling). I am of the opinion that we are dealing with the soverein of the Austrian Empire. The Austrian severin (as the German coinweights refer to it) continued from 1815 under Franz I until Franz Joseph's reign, so that your weights may well date from the 20th century if not from the 19th. In 1823, the Austrian soverein and the Austrian ducat were adjusted, and the former was made 900 fine and weighed 11.3320685 grams. In 1826, the tolerance was set at 11.32 grams, and in 1862 at 11.3 grams. Since Austria was not on the metric system until later, it is possible that this 1823 'patent' was issued only for Austrian Venice, and reflects a very close approximation to the Austrian standard in Vienna.

In conclusion, I think that each weight shows only 1/10 th of the actual number of sovereins it represents, namely your 30 equals 300 which weighs 3,369 grams, or one weighs 11.23 grams. Using the tolerance standards of 1823, namely 11.32 grams, this would indicate that this weight is 99.2 % accurate. The other three are 99.56, 99.94 and 99.2 %, respectively, for the 20, 10 and 5.

Gary Batz

* * *

Showcase

1. **Salter miniature parcel balance marked GPO and graduated 0 - 7 lb.**

Jerry Katz Collection

2. **Set of Salter postal balances in a blue silk-lined presentation case. The Balances are nickel plated. The rear one with a letter clip, is graduated 0 - 16oz. The front one has a hook for parcels.**

Jerry Katz Collection

3. **Iron scale with no maker's mark. One pan is stamped 7, the other 15. Lou would like to know if it is a letter scale from France ?**

Lou uit den Boogaard Collection

4. **Old bronze weight with no denomination and no verification stamps. The mass is 7.75 oz, height 62mm (2½"). Is it early 18th century ?**

Bob Holdaway Collection

5. **Brass coin rocker with no maker's mark, said to be for weighing a guinea. Length 50mm (2").**

George Mallis Collection

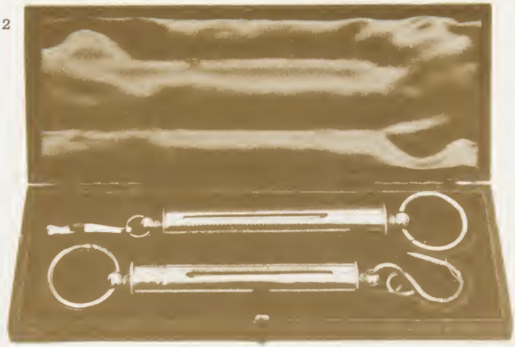
6. **Counter scale by Avery Scale Co. Milwaukee, USA, which has the shield transfer of W.& T.Avery Ltd, Birmingham. Called 'The Protector Scale' it was used in the Society Store, Mena Colonies, Iowa, until about 1975. The seller remembered buying candy over this scale in 1911.**

John Cattle Collection

SHOWCASE

1

2



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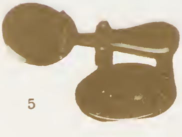
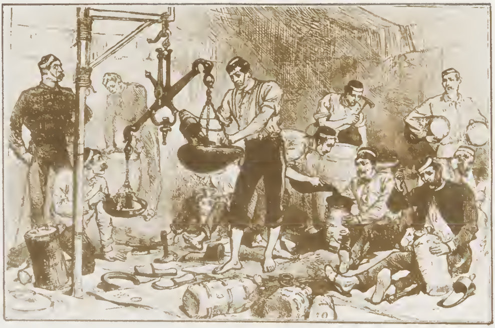
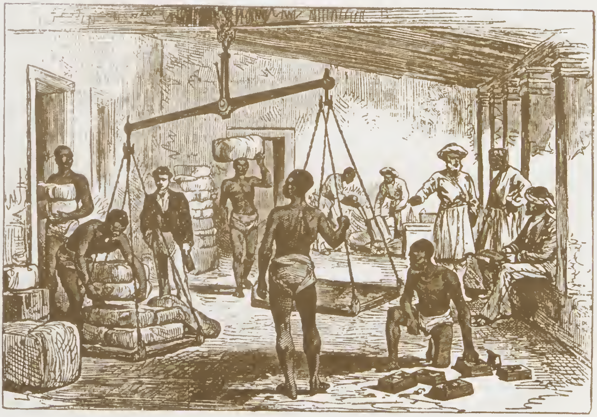


6

Old Print



Royal Artillery making up extra rounds of ammunition for night work.
Sent in by Lou uit den Boogaard



Weighing calico at the Customs House, Quillimane, East Africa.
From Illustrated London News, Nov. 23, 1878, Sent by Bob Stein.

English Coin-Weights 9

NORMAN BIGGS

For the first fifteen years of the 19th century, very little new coin of any kind was produced by the Royal Mint, and trade was conducted mainly with paper notes and unofficial token coins. Eventually, the government decided upon a long overdue reform of the coinage, involving three fundamental changes:

1. Gold, rather than silver, would be the absolute standard.
2. Gold coinage would be based on a new coin of 123.274 grains, to be known as a sovereign.
3. Silver coins would be changed in size and weight, although retaining their old names.

A new shilling was to be valued at one-twentieth of a sovereign, and so, in effect, the sovereign was identical with the traditional 'money of account', the pound of twenty shillings. The convenience of having such a coin had not existed since the early years of the guinea, in the 1660s. But, the main advantage of the establishment of the Gold Standard was that small changes in the bullion value of silver would have no effect on the currency.

In order to maintain the integrity of the coinage, it was necessary to provide for the withdrawal of light gold, and this entailed the application of the Recoinage Act of 1774 (14 Geo.III c.70) to the sovereign coinage. Accordingly, in 1817, the proclamations announcing the new coinage specified a least current weight of 122 3/4 grains for the sovereign and 62 1/4 grains for the half-sovereign. Two things soon became clear: the allowance for natural wear of just over 1/2 grain for a sovereign was too small and, whatever the allowance, coin-weights were needed to enable the public to cooperate in the removal of light coins. The *London Gazette* of 3rd March 1821, announced measures relevant to both points. It published the text of a proclamation, dated 6 Feb 1821, which reduced the least current weights for the sovereign and half-sovereign to 122 1/2 grains and 62 1/8 grains. This was followed by an item headed 'Notice, Money Weights', which began by reminding the public of the provisions of another Act of 1774 (14 Geo III c.92) concerning the official stamping of money-weights. The notice continued with imperially turgid prose:

> *Notice is therefore hereby given, to all persons requiring their weights to be stamped, that attendance will be given at the Weigher and Teller's Office, at the Mint, on Wednesday the fourteenth instant, and every subsequent Wednesday, between the hours of ten and three o'clock, for the receiving the said weights which are to be left with the said officer, and after the same have been compared with the weights in the Office, and found to be true and just, they will be marked with the following impression, viz,. on one side, His Majesty's Crest with the words 'Royal Mint' and the date of the year of the Proclamation, and on the other side, the current weight of the denomination of the coin, and delivered to the owners on their paying the fee directed by the Act of Parliament of the fifteenth, Geo III cap.30, viz. one penny for every twelve weights so stamped or marked before the same are delivered. And all persons counterfeiting or selling forged stamps will be prosecuted as the Act directs.*

There are two notable differences from the way in which stamping had been carried out in the last quarter of the 18th century (Part 8). First, the Stamper of Money weights was now identified with the Weigher and Teller, one John Field, an official under the direct control of the Mint. Secondly, instead of simply impressing an official counterstamp upon the verified weights, the Stamper was now to strike the full design on both sides of the weights. Persons requiring weights would presumably submit plain blank discs for verification and stamping.

The sovereign and half-sovereign weights described in the Notice are illustrated in Figs 1 & 2. It must be remembered that the date 1821 refers to the date of the proclamation, so that weights bearing this date were produced for a number of years, and this explains why they are relatively common. Rather less common are the weights with the same design for the guinea, half-guinea, and seven-shilling piece, shown in Figs 3,4 & 5. These coins remained in circulation for a time, although it is likely that most of them had been withdrawn for recoinage by about 1830. (They were not officially demonetised until 1892). An even scarcer weight, Fig 6, is that for the double sovereign, a coin which did not meet with public approval. The weight has the same design as the sovereign weights, but the date is 1823, the only year in which double sovereigns were issued for circulation.

In addition to the official weights, there are some unofficial weights for sovereigns dating from this time. Several types of knobbed weights used with beamscales and folding balances can be ascribed with certainty to the 1820s, because they occur in sets of five (for the sovereign and its half, guinea and its half, and seven-shilling piece). Almost certainly, some other unofficial weights were made at this time, but the majority of them seem to have been produced rather later, during the revival of coin-weighing activity in the 1840s.

The initial cause of this renewed activity was the discovery that sovereigns in circulation were wearing more quickly than had been expected, probably because individual coins were now changing hands much more frequently than hitherto. A proclamation dated 3rd Jun 1842 announced that a large quantity of light gold was circulating, and reminded the public of their legal obligation to refuse coin below the least current weight. The proclamation caused a sudded increase in the demand for the official weights, and the newly-appointed Stamper of Money Weights, James Hill, had to ask for extra help. Official sovereign weights with the same design as the 1821 weights, but dated 1842, are rather scarce Fig 7. Apparently, no official half-sovereign weights with this date are known, probably because the old dies for the 1821 half-sovereign weights were still usable.

But there are several types of unofficial weights, for both sovereigns and half-sovereigns, bearing the date 1842. One such type was made by W.& T.Avery, Fig 8, and there is a rather similar type by W.Chambers Day, Fig 9. An interesting weight was produced by I.& C.Ratcliff, Fig 10. The obverse is a copy of the official design, but from a different die, and it is possible that this is the type which Dyer (35) tells us was objected to by the Mint. Among the other types are weights bearing the legend WARRANTED CURRENT STANDARD, Fig 11, and a crowned V, Fig 13.

A further problem affecting the use of money-weights came to light at this time. In 1825, it had been discovered that the Standard weights used by the Mint were lighter than the legal standards kept by the Exchequer. The difference was trifling, and of no consequence in weighing an individual sovereign, so no action had been taken. But, towards the end of 1842, the President of the Board of Trade, W.E.Gladstone, insisted that the Mint standards and coin-weights used by the public be replaced (6, p.307). He was supported by the Bank of England, which also suggested that a new design be introduced. The high points of the old design were liable to wear, and a design with the legend incuse would be preferable. William Wyon, the Chief Engraver at the Mint, produced a suitable design, incorporating his famous portrait of the young Queen Victoria, Fig 12. A notice in the *London Gazette* for 28th April 1843 announced that, since the old money-weights had been found to have 'slight irregularities', they could be exchanged without charge for the new weights. The government's determination to avoid the traditional evils of an inferior coinage was reiterated in a proclamation dated 1st October 1843, which, once again, reminded the public of the need to weigh gold coins and reject any below the least current weight. At the same time, the Bank announced its intention of enforcing its legal right to deface light coin offered to it as from 1st January 1844. The free exchange of old weights for new ones ceased at the end of March 1844, but the new official weights bearing the date 1843 continued to be issued to those who wanted them.

As might be expected, there are several types of unofficial weights attributable to this period. The type with the legend WARRANTED CURRENT STANDARD, Fig 11, also occurs with the date 1843, and there is a delightful type with the same date depicting a beehive, Fig 14. A scarce type bears the date 1 Jan 1844, Fig 16, presumably referring to the Bank's deadline for the return of light gold.

In addition, there are many undated types. W.& T.Avery produced a floral design, Fig 15, and a plainer design with a crown, Fig 17. The latter type also occurs with a plain reverse. Other types are shown in Figs 18 & 19.

Finally, there are some very simple types with a symbol or brief denotation of value stamped incuse, Figs 20, 21, & 22.

After the flurry of activity in the 1840s, the use of coin-weights gradually decreased. It would be comforting to suppose that this was because a sound system of administration of the coinage was in operation, but the reality is rather different. Although the authorities were keen to withdraw light gold, they did so only at the expense of the holder of the coin. The 19th-century economist W.S.Jevons wrote in 1875 (39) that few (and foolish) were the people who took their sovereigns to the Bank of England, which was the only place where coin was weighed and if light, redeemed at the bullion price. Sensible people passed on their worn sovereigns in routine transactions, where coin was not weighed. In 1868, Jevons had carried out experiments (38) showing that about one-third of the sovereigns in circulation fell below the least current weight, which suggests very strongly that most people were not using coin-weights at that time. The real reason for the demise of coin-weights was the traditional one - they were a nuisance. Effectively, people were satisfied with a token coinage because, in practice, they could always obtain face value for their coins. Of course, in time the situation might get worse and the old problems might return, but that point had not been reached, and the man-in-the-street could not be expected to worry about it.

The story of English coin-weights is not quite finished. In 1870, a new Coinage Act consolidated and updated the provisions of all previous Acts. In particular, it transferred responsibility for coin-weights from the Mint to the Standards Department of the Board of Trade. The Mint had continued to issue numbers of the official weights, and the Department was empowered to carry on this practice. The demand was small but not zero. The Standards Department weights shown in Figs 23 & 24, differ from the Royal Mint weights in that they bear the date of issue, and the least current weight is given in grams, as well as grains. These weights are very scarce, but examples are known for several of the years from 1870 onwards. The latest so far recorded is a half-sovereign weight dated 1892, Fig 25. Ronald Stocks (40) indicated that, in 1902, on the succession of Edward VII, new dies for official sovereign and half-sovereign weights were prepared, but no examples of the weights are known.

In the last quarter of the 19th century, there were a few final flickers of interest in the weighing of coins. The Weights & Measures Act of 1878 led to a small increase in the demand for the Standards Department weights. An Act of 1889 authorized the Mint to receive at face value, sovereigns up to four grains below the full weight. Some weights related to this Act have been reported by Gary Batz (EQM p.926), but they should possibly be described as banker's weights, rather than coin-weights. And we should remember that throughout this period, shopkeepers and publicans (especially) continued to use 'rocker' balances, although their purpose was to detect base counterfeits, rather than worn gold.

Thus, the story ends. Today, nobody thinks about weighing coins, because we have discovered a workable system of token coinage. Indeed, but for the vanity of kings, governments, and economists, we might have discovered it a lot sooner. But that would have deprived us of the joy of studying the fascinating series of English coin-weights.

CLASSIFICATION

The sovereign series of weights makes up the final group in the scheme. The 1821 guinea weights seem to belong here, rather more naturally than with the 18th-century weights.

GROUP J	Weights issued from 1817 onwards.
Subgroup J1	Official weights issued by the Royal Mint or by the Standards Department. Figs 1-7,13,23-25
Subgroup J2	Unofficial weights carrying dates 1842, 1843 or 1844. Figs 8-12,14,15
Subgroup J3	Undated weights with struck-up designs Figs 16-19
Subgroup J4	Undated weights with simple incuse designs Figs 20-22
Subgroup J5	Miscellaneous knobbed and nested weights.

REFERENCES

References 1 - 37 are given in earlier parts.

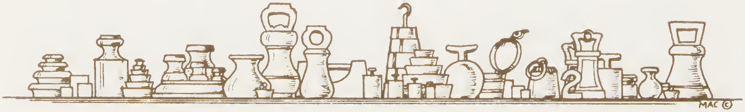
38 JEVONS W.S.: 'On the Condition of the Metallic currency of the United Kingdom' Journal of the Royal Statistical Society, Vol 31, 1868, pp.426 - 464.

39 JEVONS W.S.: 'Money' London, 1875. (23rd edition, 1910)

40 STOCKS Ronald: '19th Century Sovereign Weights' Libra Vol 9, pp.32-35, 50-53, 65-68, 86-87.

ACKNOWLEDGEMENTS

The author is very grateful to those people who have helped in various ways with the preparation of this series of articles. Special thanks are due to George Chmielinski, Graham Kendall, Philip Lloyd, Nigel Mills, Dennis Vorley, Marion Archibald (British Museum), and Nick Mayhew (Ashmolean Museum). Finally, Michael and Diana Crawforth have gone way beyond the call of editorial duty with their advice, encouragement, and practical help.



ERRATUM

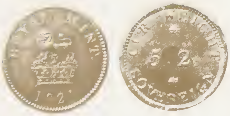
The table of English and Portuguese coins on page 1062 should have included the following coin: Apologies to Norman Biggs - Editor.

English Name	Portuguese name	Value	Weight
Half johannes	2 escudos	18s	4 dwt 14½ gr = 110½ gr

ILLUSTRATIONS

Note: Weights from this period are usually accurate and no useful purpose is served by recording the weight of each specimen.

1. Obv. ROYAL MINT, lion on crown, 1821. Rev. CUR^{t} WEIGHT, 5.2½ (very small DW GR over), SOVEREIGN. 21mm.
2. Obv. as No.1. Rev. as No.1 but weight is 2.13⅛, and value HALF SOVEREIGN. 19mm.
3. Obv. as No.1. Rev. as No.1 but weight is 5.8 and value GUINEA. 21mm
4. Obv. as No.1. Rev. as No.1 but weight is 2.16 and value HALF GUINEA. 19mm.
5. Obv. as No.1. Rev. as No.1 but weight is 1.18 and value SEVEN SHILLINGS. 16mm.
6. Obv. as No.1 but base of crown is concave upwards and date is 1823. Rev. CUR^{t} W^{t} 10.5 (very small DW GR over), DOUBLE SOVEREIGN. 22mm.
7. Obv. as No.1, but date is 1842. Rev. as No.1. 21mm
8. Obv. STANDARD, crown, W.T.AVERY. Rev. CUR^{t} WEIGHT, 1 SOVEREIGN, 1842. 21mm.
9. Obv. STANDARD, rose, W.CHAMBERS DAY. Rev. CUR^{t} WEIGHT, SOVEREIGN, 5.2½ (very small D G over) 1842. 21mm.
10. Obv. ROYAL MINT, lion on crown, 1842 (not the same die as No.7) Rev. SOVEREIGN, ONE, I.& C. RATCLIFF. 21mm.
11. Obv. ONE, crown, SOVEREIGN. Rev. WARRANTED, 1842, CURRENT STANDARD 21mm.
12. Obv. ROYAL MINT, portrait of Queen Victoria to left, 1843. Rev. CUR^{t} WEIGHT, 5.2½ (DW GR over), SOVEREIGN. 21mm.
13. Obv. SOVEREIGN V, ½ alongside, 1842. Rev. blank. 20mm.
14. Obv. WARRANTED CORRECT, surrounding a beehive. Rev. ONE SOVEREIGN WEIGHT 1843. 22mm.
15. Obv. ONE SOVEREIGN, surrounding a rose, thistle, and shamrock. Rev. W.& T. AVERY, BIRM^{m}, around three concentric circles. 22mm
16. Obv. HALF SOVEREIGN, 2.13⅛ (DW GR over) JAN. 1, 1844. Rev. blank. 20mm.
17. Obv. as No.1. Rev. W.& T. AVERY, STANDARD, around a single circle. 21mm.



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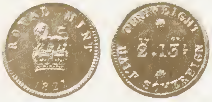

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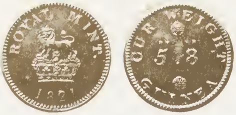

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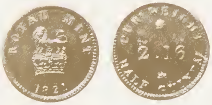

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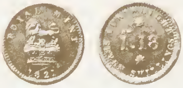

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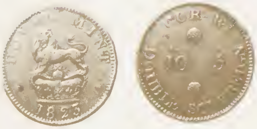

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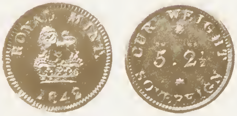

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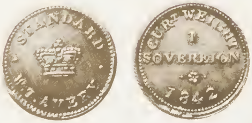

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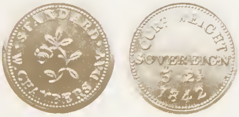

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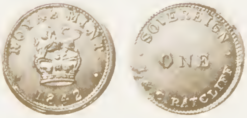

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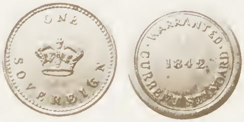

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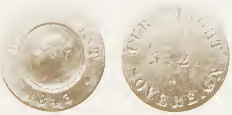

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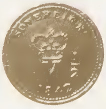

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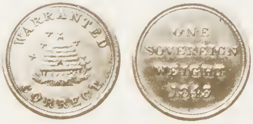

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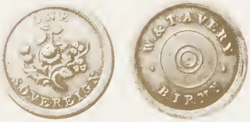

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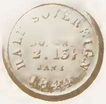

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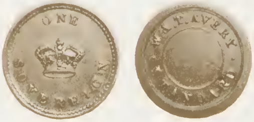

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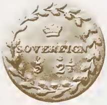
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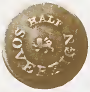
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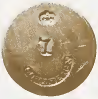
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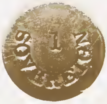
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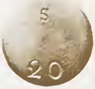
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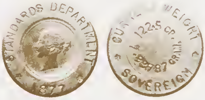
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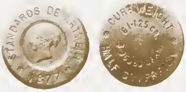
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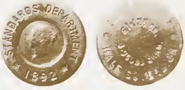
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18. Obv. Wreath of leaves, small crown, SOVEREIGN, 5 2½ (small D G over). Rev. blank. 22mm.

19. Obv. HALF SOVEREIGN surrounding small lion passant to left. Rev. blank. 19mm.

20. Obv. Stamped crown, 1, SOVEREIGN (in small raised letters on an incuse curved field). Rev. blank. 20mm.

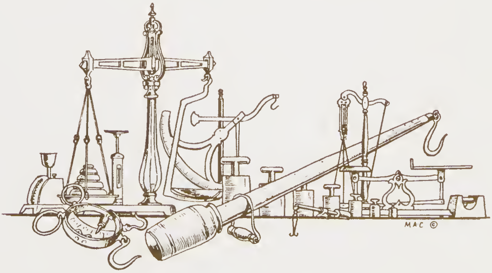
21. Obv. stamped 1 SOVEREIGN (in large incuse letters in a semi-circle). Rev. blank. 22mm.

22. Obv. stamped S 20. Rev. blank. 20mm.

23. Obv. STANDARDS DEPARTMENT, portrait of Queen Victoris to left, 1877. Rev. CURRENT WEIGHT, SOVEREIGN around a circle. 122.5 GR, 7.93787 GRAM inside. 21mm.

24. Obv. as No.23. Rev. CUR^{t} WEIGHT, HALF SOVEREIGN around a circle, 61.125 GR, 3.96083 GRAM. inside. 19mm.

25. Obv. as No.24, but date is 1892. Rev. as No.24, but no circle. 19mm.



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EQUILIBRIUM®

QUARTERLY MAGAZINE OF THE INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

1988-ISSUE NO. 3

PAGES 1133-1160

Editor's Comment

Regulation of weights and measures has been with mankind for a very long time. The Romans, with their practicality and sense of law and order, had their inspectors of weights and measures, and I doubt they were the first civilization to do so. Throughout history, the struggle to prevent fraud has been combined with striving to improve accuracy and to create uniformity. While the accuracy has steadily improved, uniformity has yet to be achieved, world-wide.

In this issue, Gene Mahoney discusses the manufacture and use of Colonial American standards of weights and measures, and Bob Holdaway sets down the careful procedure used in the United Kingdom to ensure the accurate checking of traders' weights and measures.

Readers are invited to comment, or to write about their own national standards, or their own country's inspection of weights and measures.

Cover Picture

Casartelli's 'Universal Yarn Assorting Balance' is very small, with a wire beam only 62mm long (2.5"). It looks delicate and attractive with its brass pillar, base and template squares, black painted sight-board and arc, dark maroon box, and red lining material. It was designed as an improvement to Emil Staub's original design and Casartelli described the benefit as follows:

> *In the past it has been necessary, in order to get accurate results, to judge correctly the parallelism of two wires some distance from each other, and in this, different observers might not agree. In the IMPROVED PATTERN a fixed datum line is provided, to which the indicating needle must be brought before and at the end of each test, thus ensuring a far more correct reading than formerly.*

INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

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Colonial American Weights & Measures

GENE MAHONEY

England's colonies in North America were able to use the weights and measures standards which the settlers had used in England prior to their arrival on these shores. Indeed, fishing boats had been coming to the American shores for untold centuries prior to the first permanent settlement of the Pilgrims in Plymouth, Massachusetts, in 1620. The fishermen were undoubtedly using containers and measures of known European standards.

Plymouth, England, was the home port of a fishing fleet of fifty or more vessels sailing each year to the banks of Newfoundland, and other ships traded down the North American coast.

Roland G. Usher states that 'among the materials brought (by the Pilgims) were an elaborate set of tools for wood-cutting, coopering, and carpentry as well as equipment for a blacksmith's shop and an anvil', (1, p.75). It appears to have been a lack of dependable food supplies, rather than equipment, which made the early days of Pilgrim settlement so difficult.

An allocation of land was one of the earliest needs for the new settlers. The measurements and designated locations of land distributions show that the earliest New England settlers brought surveyor's chains or equivalent measuring devices.

The source of other measures for the new colony may be found in the person of John Alden who was hired by the Pilgrims at Southampton, England. Charles M. Andrews states that the crew of the Mayflower which departed Plymouth on 16 September 1620, included 'four quartermasters, at least one carpenter, two or three cooks, one or more gunners, and a boatswain or two. Five men, among whom was John Alden, were hired at Southampton. Alden was employed as a cooper to look after the beer hogsheads (barrels) and remained in the Colony, instead of returning to England, probably because of the attractions of Priscilla Mullins, whom he may have known and courted before he joined the ship', (2, p.270)

In his handbook on coopering, Fred P.Hankerson states that 'cooperage occupied the decks and the hold of the Mayflower, when she set sail with the Pilgrims in 1620. Azel Ames, author of 'The Mayflower and Her Log' tells us that provisions carried in barrels and hogsheads included biscuits or ship bread, oatmeal, rye meal, beef, pork, hams and shoulders, salt, beans, cabbages and peas, vinegar, beer, brandy and gin. He tells us that cooper's tools were included in the cargo'. (3, pp.13, 14)

Hankerson further notes that 'by the fifteenth century the wooden barrel was performing as a measure, as well as a container. In England, a statute of 1423 fixed the capacity of a hogshead at 63 old wine gallons, equal to

52½ imperial gallons. During the reign of Richard III in England, a wine barrel was standardized at 31½ gallons'. He continues, 'During the reign of Henry VIII, legal capacities of several other barrels were set by statute. The London ale barrel was standardized at 32 beer gallons. It soon was the practice to measure oil, spirits, tar, and pork by the wine barrel, vinegar by the 34-gallon barrel'. (3, p.11).

Surely, all of these capacities and required barrel measures would have been known to John Alden. When the Pilgrims' provisions were short in 1621 and 1622, measurement of an Indian Corn share, whether in an approved and accepted Alden-made measure, or in some other accepted container of agreed size, that measure was 'standardized' to the satisfaction of the recipients.

Some early measures might well have been of basket work, for John E. McGuire informs us that, 'The new land abounded in forests; any man with an axe and a knife could rough out enough tools and receptacles to supply his family. If finer, or more complex pieces were desired, the local cooper or carpenter could supply them'. McGuire also mentions that the first settlers brought with them baskets and basket-making skills utilized for centuries in Europe, (5, p.viii, 3).

John Alden and the Mayflower carpenters do seem to be the source of the first Plymouth Colony containers and measures. Whether the barrels, bushels, quarts, pints or pottles (two quarts), initially conformed to the measurements of the Winchester standards is not known, but later regulations made this a requirement.

Among the earliest Virginia Colony records, the Laws and Orders decided on by the General Assembly, 5th March 1623-24, merely stated 'That there be no weights nor measures used but such as shall be sealed by officers appointed for that purpose', (6, p.126).

The first legislation in Maryland upon the subject of weights and measures was in the Act for Measures and Weights, which was engrossed at the Assembly in February, 1638, and which, although not actually passed, according to John H. Alexander, has been preserved in the archives. This Act provided that 'there shall be one standard measure throughout the province, as shall be appointed by the Lieutenant General'. It then prescribes, with detail, says Alexander, how the dry measures of shelled-corn shall be regulated, according to the age and presumed dryness of the grain; and finally interdicts the use of all weights and steelyards not appointed by the Lieutenant General, except the same be small and 'sealed in England', (7 pp.5,6).

In the records of the Colony of New Plymouth, in New England, for January 1633-34, it is recorded 'That whereas great abuse may arise by diversity of measures, it is ordered that all measures be brought to the messenger or constable of Plymouth to be sealed, and that it be lawful for any to refuse any that hath not the seale prefixed thereon', (8, p.23).

Later, at a Plymouth Court held on the 5th July 1635, 'It was decreed that the new bushel (being a sealed bushel brought out of England, of Winchester measure) should be allowed, and no other; and all other measures to be brought into the constable, to be made conformable to the same, and so to be sealed by him, with the seal appointed for that end; and this to be done by the last of the present month. But notwithstanding that, all former bargains and sales that were made before this day, they are to be fulfilled by old measure', (Court Orders, pp.34,35).

The Winchester bushel of Henry VII (1495) still in use in England in the 17th century. This is the standard adopted in the colonies.

As of December 7th, 1641, in Plymouth, it was considered 'meet that the following be repealed: 'That all weights and measures in every town within the government be made equal by one thereunto especially appointed and that a bushel a half bushel a peck and a half peck be procured to be made by the (Massachusetts) Bay standard and that the Grand Jurymen of every town do assist Josiah Pratt in making all measures even accordingly and these to be done by the end of March next', (Court Orders, p.38).

In a summation of the Plymouth Colony laws, the following were recorded. In 1636, it was 'enacted by the Court that one Common Standard be used for weights and measures and that according to Winchester which is the Standard of England'.

In 1652 it was 'enacted by the Court that every town within this Government shall have a standard for measures of corn made by those that are provided at Plymouth by a former order of Court for that end to try and seal their measures by which are to be uniform amongst them and to be made round; and these to be made by the last of November 1658 and to be kept by the sealers of every town for the towns use'. In the same year, the Court required 'That in every town within this Jurisdiction there be one appointed to try and seal measures; and to have for every measure four pence which shall be tried and sealed by him; and only round measures to be allowed to buy and sell by; and that the several towns shall choose a fit person for each of them for sealer and to present him to a magistrate to be sworn.'

As of 1661, the following was recorded as the oath of a sealer of measures: 'Whereas you are chosen to the office of a sealer for the town of ________ you shall during your continuance in your said office truly and faithfully seize (size) and seal all such measures as are or shall be at any time brought in to you for that end; according to such Standards as are allowed and provided by the Country so help...'

After the 1636 law came one of 1645 which states that 'It is enacted by the Court that none shall sell by any unsealed weights and measures which are not weights and measures by the Standard; and that if any shall so do they shall lose such weights and measures and make restitution to the parties so wronged by such weights and measures; and shall pay to the Colony's use for every such default of false weight and measure; for the first time six shillings for the second time thirteen shillings and four pence and for the third time twenty shillings and such weights and measures to be burnt; and that a pile of weights according to Winchester be procured to be the Standard; and that the sealer shall have for sealing a penny for every weight under a quarter of a pound; and for all above a quarter of a pound to six pound two pence a piece; and for all above six to a hundred pound four pence.'

As of 1645, it was also enacted that 'every miller within this Jurisdiction shall have two toule dishes viz: a quart and a pottle but to be so made that upheaped they will hold no more but a quart and a pottle by the measure allowed and those to be sealed by the last of November 1658 or else pay ten shillings for every month so long as the said miller keepeth them unsealed; and that all millers shall provide scales and weights to weigh mens Corne by; as occasion shall require.'

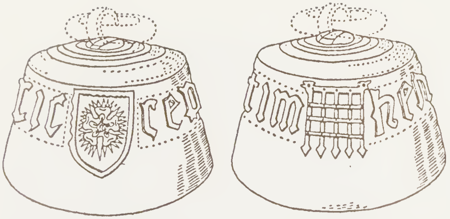
For the cooper it was law, as of 1652, that 'all such cask as shall be made by any cooper within this Jurisdiction shall have the first two letters of his name set on evry such cask he makes by a burnt mark; upon penalty of the loss of such cask the one half to the informer and the other half to the Country.' Further, 'It is enacted by the Court that all coopers within this Government are to make all their cask according to London gage upon the like penalty', (Laws, pp.198-199).

As will be noted from the dates this series of acts is a recapitulation. Both physical access to the relevant documents and time limitations precluded the detailed examination of all pertinent references. More careful study is certainly warranted.

Whatever the implications among the settlers in Plymouth and the Massachsetts Bay Colony centred at Boston, as of the 6th July 1646, it was enacted 'by the (Plymouth) Court that the (Massachusetts) Bay new bushel shall not be used to buy or sell by nor any measure made thereby and that the old Iron bound bushel is established to be the measure and standard for all the towns within this Government shall be made thereby and if any person or persons do use any other either to buy or sell by they shall pay xij^{d} (12) pence a piece to the Colony's use', (Laws, pp.49,50).

Two interesting and detailed Massachusetts records may be of greater interest:

The Dorchester (Massachusetts) Town Records report that 'At a general town meeting the 14:1:82 (14 Jan 1682) Weights are provided by Constable Elisha Foster; for to be a standard for the town according as the law requireth; bywhich all other weights are to be sized and sealed; divers of which are bell fashioned viz: one 56; one 28; one 14; one 7; one 4; one 2; the rest



The standard 14 pound Avoirdupois weight of Henry VII.

are flat weights and are one pound; one half pound; one quarter; one eighth part; one ounce; as also one half ounce; one quarter of an ounce; one eighth; one sixteenth of an ounce. These are all delivered to William Pond the 23:3:82.'

Later, it was recorded that 'the 13th Feb 1690-1691 there was delivered to Sarg(eant) Samuel Topliff, the weights and measures, that were the town standards, to try weights and measures by:-

> *of weights of bell fashion: one 56 pound; one 28; one 14*
> *one 7; one 4; one 2*
> *of flat brass weights: 1 lb; 1/2; 1/4; 1/2 quarter; 1 ounce;*
> *1 1/2; 1 1/4; 1 1/8 (i.e. one one-quarter, etc)*
> *of measure: one 1/2 bushel; peck; ell; yearden; eale quart;*
> *wine pint; two sealing eiorns.'* (9, p.285).

To come to a conclusion by bringing the information up to date, relatively speaking, at a meeting of the Boston Selectment, 31 March 1718, the following is recorded:-

> *Inventory of Standards, etc., belonging to this town for the use of the Sealer of weights etc., Measures delivered by Captain Ephraim Savage the 21st of January last into the custody of the Selectment, viz*^{t}*:*
>
> *a half bushel and a peck of cast brass*
> *a half bushel a peck and a 1/2 peck, of hammered copper*
> *a wine Gall(on), a quart, and pint of cast brass*
> *a half pint a Gill and 1/2 Gill of pewter*
> *a Beer quart and a pint of cast brass*
> *a 56 lb, a 28, 2 14, a 7, a 4, a 2, a 1 lb, a 1/2 lb, a 1/4*
> *a 2 oz, a 1 oz, of cast brass*
> *a half oz and 1/4 of oz of lead*
> *one brand, 3 stamps, 2 large hand hammers, two large Chissels*
> *2 punches, one shave, and one paring knife of iron or steel*
> *one wooden rule*
> *a pair of Tryangles*
> *a Large Beam with wooden scales*
> *2 pair of Brass Scales with beams*
> *a brass Ell and Yard in one piece*
> *a parcell of Rey* (10, p.35)

The preceding material comprises a preliminary view of some of the information available on early American use of weights and measures. It is obvious that American Colonial history is a continuation of English history in its use of weights and measures. A more detailed and analytical study is in progress. ▷

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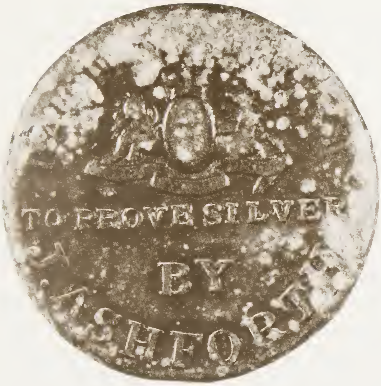
Notes & Queries

NQ 101 THOMAS GOULDING query from Roy Ladell

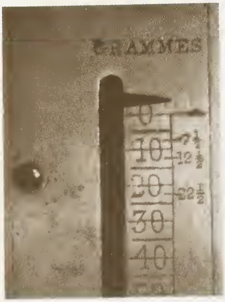
I am very much looking forward to being at Kenilworth and meeting members of the Society. I shall bring a balance that I have recently acquired, by Thos. Goulding at the Angel and Scales No. 15 in Queen Street, Cheapside, London. The rest of the label is similar to No.23 in Sheppard & Musham. Mine is not in a solid box but a made-up box with slight decoration on the lid. Please can you tell me about this maker?

REPLY from the Editor

Thomas Goulding was the son of Thomas of St.Andrews parish, Holborn, London, who was a whip maker. He was bound to John Wood, scalemaker, on 4 Aug 1757 and freed on 6 Sep 1764, in Blacksmiths' Company (guild). His trade label is identical to John Wood's, apart from the change of name and the addition of the number of the premises. So, this suggests that he was the successor to his master's business. He is recorded as taking one apprentice, George Edward Brown. Thomas Goulding was listed as a Liveryman of Blacksmiths' Company, in 1776, which suggests that he had a successful business.



The silver prover 3 x full size.



The graduations of the Salter letter balance showing the 7½, 12½ and 22½ gram marks.

NQ 102 SILVER PROVER — query from Garry Batz

I have for you something that seems to me to a first rate candidate for the 'whatsit?' department. It is a disk with a mass of 9.1652 grams, or 141.44 grains, comes in lead, is rather well worn, and has a diameter of 25mm (1"), and a thickness of almost 3mm (1/8"). The legend around the upper part is illegible. The middle of the disk has the arms of the Georges, the motto Dieu et Mon Droit on the ribbon under the supporters, the one on the right being a horse, rather than the unicorn more often seen. The inscription below reads 'TO PROVE SILVER BY J.ASHFORTH'. The disk is uniface.

English silver coins for the shilling and half-crown are listed in Volume 2 of the Universal Cambist, but the data on p.163 does not indicate any relationship of this disk with coinage, in my opinion.

REPLY — from the Editor

You've certainly found a puzzle with your silver prover. The only suggestion I can offer is that it is one of those provers which works by electrolysis. You hold the disc and a silver coin together and put your tongue across the edges of the two metals. If the silver is good, saliva acts as an electrolyte and gives a tingling sensation on the tongue as current flows. For this to work, I believe the metal has to be zinc, rather than lead.

This is only a guess, but the inscription 'TO PROVE SILVER BY' is consistent with my theory, as any silver coin, or any silver object, could be tested. I have no idea whether the system is satisfactory.

Can any member confirm the above, or provide an alternative explanation ?

NQ 103 SALTER LETTER BALANCE IN GRAMS query from Dietmar Doerr

I have a new scale, a little Salter letter balance. It is marked in "GRAMMES". I don't know why there is a special marking 7½, 12½, and 22½. I don't know the relevant country. Do you know more about it?

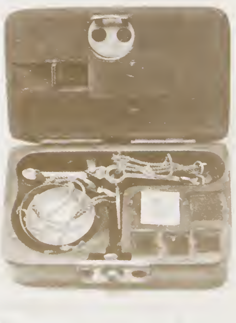
Can any member help Dietmar Doerr ?

NQ 104 BRONZE MYSTERY SOLVED note from Dietmar Doerr

I am sending you the answer to the little bronze label puzzle published in EQM (p.926). It is an identifying label used for bales of linen cloth. The new, undyed, bale was marked with the first label. A second twin label was the identifying label for the owner of the bale. It was called a 'blue-dyer-mark'.

NQ 105 DIAMOND SCALE query from George Mallis

I am sending you a picture of a recent scale acquisition which I would like your opinion on. The numbers on the weights do not refer to their actual masses. The weight marked 10 for example, has a mass of 2 grams, while the one marked 1 has a mass of 0.20 grams and the 50/100 has a mass of 0.1 grams; all in the proper mathematical progression of some series with 10 = 2 grams as a base. The initials C M. appear on the weights, and not GM which would indicate grams.



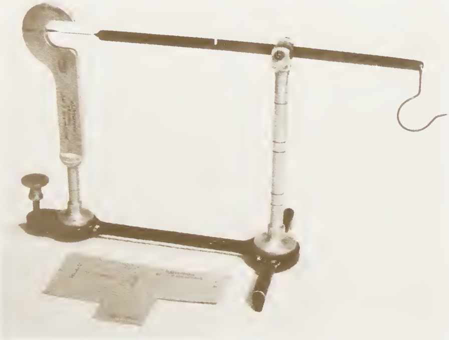
The rule is in inches.

REPLY from the Editor

I assume, from your statement, that you do not have the ISASC Handbook of Old Weighing Instruments. In there, you could find that CM stands for Carat Metrique, the international unit of 0.2 gram used for weighing diamonds since 1907. It replaced the old Troy carat of 0.207 gram. So, your little scale was for weighing diamonds.

I have a similar set which is marked with '&' on the centre of the beam. I suppose this was the maker's mark. From the style of the beam and box, I think they were made in Austria, or Germany.

Yarn, Cloth & Roving Scales 1



MICHAEL CRAWFORTH

FIG 1. Beesley's patent yarn balance made by Goodbrand & Co.Ltd, Manchester. Note the notch in the beam for suspension of the weight, the hook on the rear pillar for storing the weight, and the unusual combined template. Beam length (with pointer) is 205mm (8").

In the textile and clothing trades, the weight of yarn or cloth was one of several characteristics used to assess the substance and fineness of the material. Weighing was a simple test used by spinning mills, cloth weavers, warehousemen, cloth and yarn salesmen, clothing manufacturers, drapers, armed forces, police, railway companies, tent and sail makers, and many other trades and authorities. Those involved in prime manufacture were interested in the quality of yarn and finished cloth, while users like the police, or railway companies, wanted to check that the cloth ordered for uniforms, or for seating, was correctly to the specification when delivered. There were many different scales used for weighing, some giving very precise results in laboratory conditions, others giving approximate results for routine checking at the point of sale, delivery, or in the factory.

Weighing was used to determine the 'counts' of the yarn, this being the number of threads required to meet an agreed standard. The count was understood by makers, sellers, buyers, and users of yarn as a figure used for comparison, giving all concerned an immediate idea of the size of the yarn involved. The fairly coarse yarn used to make towelling, for example, might have counts of 12s (pronounced 'twelves'), while the fine yarn used for cotton poplin shirts is typically made from two threads of 100s (hundreds) twisted together to make a yarn of 50s. Pillowcases are typically 24s and denims have a warp and weft of 14s and 16s.

The count could be obtained by three basic methods, as exemplified by the different types of balance:

1. The fixed weight system: The number of threads of specified length which counterbalanced a fixed weight, gave the counts directly.

2. The fixed length system: The weight of a standard length of yarn was used to calculate the counts. An alternative to calculation was the use of pre-calculated tables, or 'equivalent' graduations on a balance.
3. The measured length system: The weight of any convenient size of yarn was related to the measured length of the sample, to calculate the counts.

Theoretically, all systems would provide the same count for a particular yarn, but in practice, those systems using very small samples were likely to be less accurate.

To make things even more complicated, there were many different 'standard' systems, including Yorkshire Skeins, West of England, Galashiels, American run, and cut, German Wool Count, and for silk, Legal Silk, Paris, and Denier.

Weighing was also used for comparing woven cloth. For this purpose, a small sample of cloth was cut to the size of a standard template and weighed. Typical template sizes for cloth were 1 x 1 inch, or 3.6 x 3.6 inches (a tenth of a yard square). The weight per unit area was determined by calculation, tables, or equivalent graduations on a balance. The units used were usually ounces per square yard or ounces per 100 square yards, or, if metric units were being used, grams per square metre.

When weighing cloth or yarn, it is necessary to make allowances for various physical characteristics. For example, moisture content can vary greatly and give erroneous readings. So, for accurate weighing, the yarn has to be dried in a special oven, in England usually at 212°F for cotton (100°C). Subsequent allowance is made for a moisture absorption of 8.5%, the figure adopted as a standard for cotton measurement (11% for silk; 16% for woollen cloth, etc).

Further allowances have to be made for the processes to which the yarn or cloth are subjected. Bleaching cotton yarn reduces the weight by 4% to 6%. Dying can add weight, particularly if dark colours are used, and some black dyes add about 10%. Printing of cloth also adds weight, from about 3% to 6%.

When yarn is woven into cloth, extra length is used in bending under and over the cross threads, and the amount taken up is rarely the same for both warp and weft (the longitudinal and lateral threads). Consequently, in measuring the counts from a sample of cloth it is necessary to weigh threads from both warp and weft, either making an allowance for the bends, or straightening the threads before measuring.

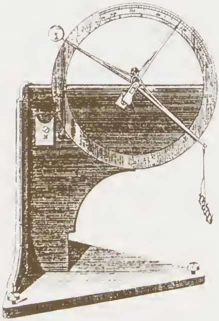


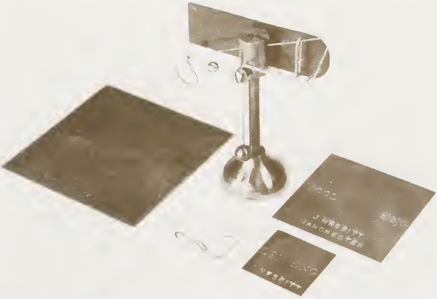
FIG 2. Ludlam's inclination wool balance.

The earliest balance specifically designed for weighing yarn, known to the author, was a wool quadrant described by Ludlam in 1765 (EQM pp.605, 606). Nothing else is known about the early weighing of yarn until the middle of the 19th century, when inventors started to take out patents for yarn balances, Fig 2.

Many yarn balances worked on the estimating principle, based on testing a small sample. The design much used in England was patented in 1886 by H.B.Barlow on behalf of Emil Staub of Germany, and was made by George Thomas & Co. of Manchester, Fig 3. The same design was also made or sold by two other Manchester firms, John Nesbitt, and Joseph Casartelli, and their successors. This 'yarn assorting' balance had a delicate wire beam about 60mm (2.36") long, on a turned brass pedestal. At the left end of the beam there was a small bent wire weight shaped like a hook. This was the standard weight. Threads of a specified length were hung on a larger wire hook at the right end of the beam, until a balance was achieved. The number of threads required represented the 'counts' of the yarn. So, 42 threads was expressed as a count of 42s, and 57 would be 57s, and so on. For greater accuracy, threads of twice the standard length were used, and a 'doubling weight', shaped like a letter 'S' was hung from the standard weight on the left end of the beam. This 'S' weight was also used to test and set up the balance by placing the weight on the right end hook. If correct, the balance beam had to be level. When testing very fine yarns, with a count of over 100s, tedious counting was avoided by using a 'reducing weight'. This 'U' shaped wire weight was hung on the thread hook at the right end of the beam to reduce the number of threads required to achieve equilibrium. The number of threads used was then multiplied by ten to obtain the correct count, thus 11 threads would give a count of 110s.

Threads of a standard size for weighing were obtained by cutting the cloth to the size of a template provided with the balance. Each type of fibre had its own template, i.e. for wool or worsted, linen, or cotton. When the cloth was cut to size, the warp threads were unravelled and weighed, then the weft threads were unravelled and weighed. An allowance of 5 per cent was made for the under-and-over waviness of coarse yarns. This procedure was suggested in the balance makers' instructions, but for more accurate results, Curtis (1) recommended that the threads were unravelled first and then cut to length, being careful to eliminate the bends formed by weaving by straightening the thread before cutting. If yarn had to be tested, it was wound around the template and then cut at both ends to form short threads, whereupon it was weighed, as before.

These little 'Staub' balances were provided with a pendulous wire index for accurate reading on an unlevel surface, and a black-painted sight-board behind the wire beam, to assist in seeing the slender form. However, Staub's design was criticized by users because of the difficulty of assessing whether the beam was level, or not. This problem was eliminated in an improved version made by J.Casartelli & Son, who provided a downward projecting pointer which registered against a line on a small arc fixed to the pillar, Fig 5. This version had the base of the balance fixed to a hinged drop-down section of the box, and was fitted with a levelling screw.



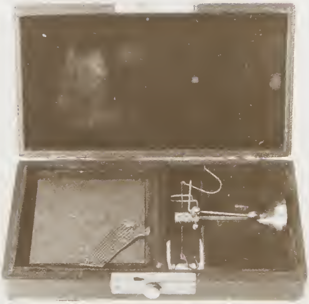
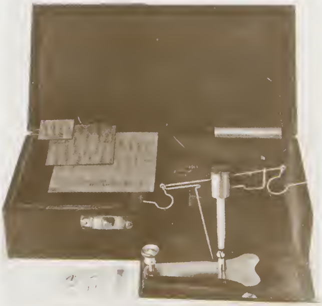


FIG 3. Above: Emil Staub's little yarn balance with its wire beam and pendulous index. The tiny wire weights are shown stored in a piece of paper between the brass template squares. Beam length 62mm (2.5").

FIG 4. Left: Staub's balance stored in its box. A piece of ribbon is provided for lifting the templates from their recess.

FIG 5. Casartelli's improvement on Staub's balance, showing the way the beam was bent back and down to form a pointer. The base of the balance was permanently fixed to the drop-down section of the box. (See also Cover Picture).



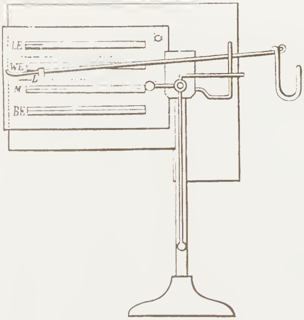


FIG 6. Staub's 2nd British patent was for this steelyard with four sets of graduations.

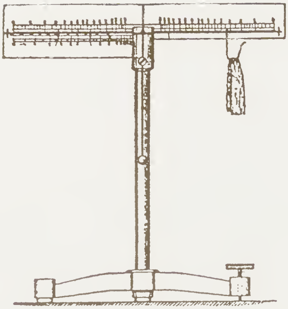


FIG 7. Thomas patented an unusual design with a movable weight and a pre-set movable load hook.

In 1889, George Thomas obtained another British patent for Emil Staub. This time it was for a steelyard version of his balance, Fig 6. In this design, also known as Dietze's yarn balance (1), the sight-board was greatly enlarged and carried a series of graduations, one for each of the fibres. A sliding weight replaced the fixed weight of the earlier type described above. With this balance, any convenient length of yarn could be tested. The yarn sample was placed on the hook, then the sliding weight was adjusted to achieve equilibrium. The figure taken from the appropriate set of graduations was divided into the length of the yarn sample to give the counts.

George Thomas, himself, patented the next development, in 1890, Fig 7. In his modification of the design, there was a sliding hook on the right arm of the beam, and two sliding weights on the left arm. A sample of yarn was cut and its length measured. The sample was then placed on the hook which was moved along the beam to the graduation expressing the length of the yarn sample. The top weight on the left side was moved to the corresponding graduation on the other side, to tare the hook. Then the lower weight was moved to obtain a balance. The weight of the yarn sample was given in grains, on the second row of graduations, and the counts on the lower graduations.

An improvement on Staub's first design was known as Blackburn's yarn balance, made by John Nesbitt Ltd, Fig 8. It had a longer, sturdier beam with a sight-board having a level line and graduations marked on it. Blackburn's balance was used in the same way as Staub's first design described above, except that the 'U' shaped weight required a multiplication of two, instead of ten, and was consequently more accurate. The fulcrum of Blackburn's balance was cleverly designed to use a standard stiff-back razor blade as the knife edge, so that it could be replaced at any time by a purchase from the nearest chemist's or barber's shop.

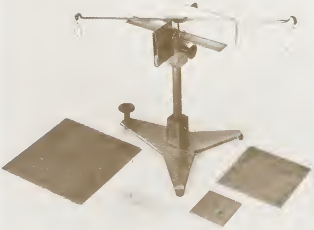


FIG 8. Blackburn's yarn balance had a relatively substantial beam 147mm long (5.75"). The razor blade fulcrum can be seen housed in the central rectangle of brass.

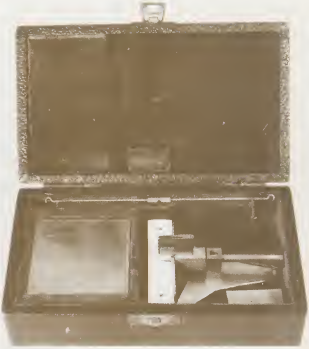
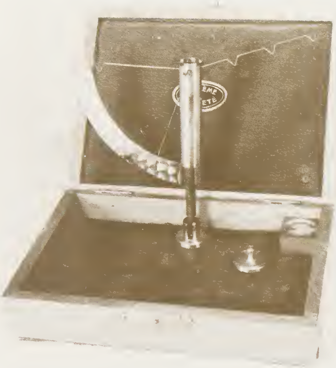


FIG 9. Blackburn's balance in its box.

Another balance used in the same way as Staub's first design was patented by H.Beesley, in 1922, and made by Goodbrand & Co. Ltd. of Manchester. In Beesley's balance, the beam was extended on the left to provide a pointer which registered against an index fixed to a second pillar, Fig 1. A levelling screw enabled the balance to be set accurately before commencing weighing. Two weights were provided, the larger one normally being used. The weight was placed in a small notch in the left arm of the beam, then threads cut to the size of the template provided, were placed on the hook. As before, the number of threads gave the count. If cotton yarn was being tested, and only small lengths were obtainable, the small weight and 'half-cotton' template were used. Beesley's template had an unusual design whereby the dimensions for all fibres were combined in one piece of metal, Fig 1. The weights were meant to be stored on a small hook on the index pillar, but they are usually missing by the time the balance gets into a collector's hands.

The unusual balance shown in Fig 10, was sold (and made?) by W.A.Le Blanc of Enschede in Holland. According to the label, it was also available from Mr. Thomas of Manchester, England (was this George Thomas who made Staub's balances?). The pillar was hinged, telescopic and revolvable to enable the user to adjust the level of the balance, to raise it to a convenient height, and to fold the balance down for storage in its box. To set the level correctly, a test weight was suspended from the notch at the end of the right arm, then the pillar was tilted until the pointer registered against the mark on the arc. The weight was then removed and the samples of thread of any convenient length were suspended from one of the notches in the right arm, according to the fibre being tested. The right notch was for



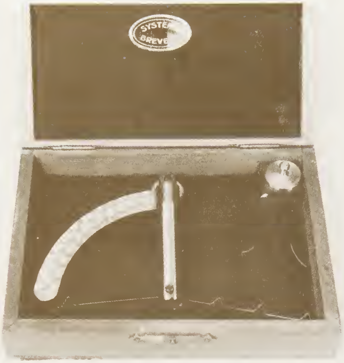


FIG 10. Le Blanc's balance has 'V' notches in the beam for the threads and the weight. Tiny aluminium weights are stored in a wood block with a knobbed brass lid.

FIG 11. Le Blanc's balance folded down and telescoped in for storage.

cotton or silk, the centre notch for worsted, and the inner notch for linen. The thread was cut short until the balance registered on the level mark, then the length of thread remaining on the balance, in centimetres, gave the counts. For greater accuracy, a weight could be hung on the end of the left arm to increase the length of thread required to balance. Three weights were provided, giving multiplication of the counts by 5, 10 or 15.

Quadrant, or pendulum balances were also much used for testing yarn and cloth. The Lancaster yarn and cloth quadrant, made by Goodbrand & Co. and by John Nesbitt, was very useful for estimating the counts of yarns when a good long sample was available, Fig 12. The balance was set up using a small test weight normally stored on a hook on the pillar. Firstly, the balance was set to zero using the levelling screw. Then, with the test weight on the hook, the pointer swung to 40. If it did not, the small adjusting nuts above the fulcrum were screwed up or down until the correct reading was obtained, resetting the zero point after each adjustment. Forty yards of yarn was hung on the hook and the pointer registered the counts on the graduations marked '40 yards'. The centre graduations, marked '4 yards' were used with 40 threads cut to the size of a template, and the graduations again gave the counts. The top graduations were used to find the weight of a piece of cloth from a small sample cut to the size of the same template. These graduations gave the estimated weight of a piece of cloth 1 yard wide by 100 yards long.

Goodbrand's lea or hank quadrant was for determining the counts from a lea of cotton (120 yards), Fig 13. The lea of yarn was measured using a 'wrap reel' winder, and then the yarn was placed on the hook of the quadrant. ▷

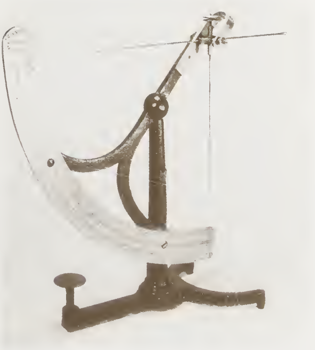


FIG 12. 'Lancaster' quadrant marked John Nesbitt Ltd, 42 Market St, Manchester. The test weight is on its storage hook on the pillar. Height 270mm (10.5").

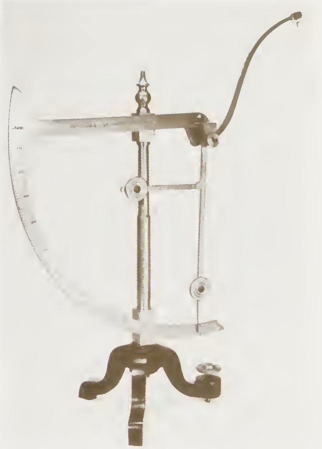
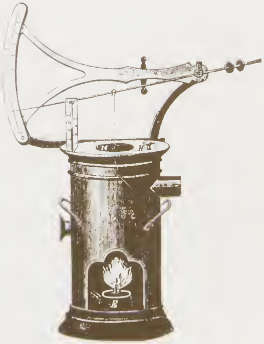


FIG 13. Hank quadrant marked Goodbrand & Co Ltd, Makers, Manchester. Height of pillar 455mm (18").

FIG 14. Below right: A Yarn drying or 'conditioning' oven with an integral inclination balance for use during the drying process.



▷ The graduations gave a direct reading of the counts. Accuracy of this type of balance was checked with a 2 dram weight suspended from the hook, whereupon the pointer had to register counts of 18 2/7s. The weight at the end of the arm at 90° to the pointer counterbalanced the curved arm of the beam and the hook, enabling the pointer to hang vertically down at its zero position.

PART 2 will describe more balances including American and French designs.

Weights in the Burrell Collection

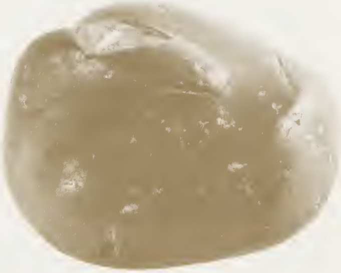
BRIAN BRASS

No visit to Glasgow can be considered complete for art lovers without a visit to the Burrell Collection. Accumulated by Sir William Burrell, a wealthy shipowner, the collection numbers some 8,000 items and represents a veritable Aladdin's cave of valuable and exciting works of art from all ages and all corners of the ancient and civilised worlds. The collection was presented to the City of Glasgow in 1944, but because of the conditions attaching, namely that it must be housed within twelve miles from the city centre, it remained hidden for over twenty years, despite a further gift of £450,000 by Sir William to enable his wishes to be observed. In 1967, another wealthy Glaswegian, Mrs Anne Macdonald, left to the city Pollock House, a magnificent estate set in many acres of park and woodland, thus enabling a purpose-built museum to be housed in the rural setting envisaged by the great benefactor. It was opened to the public in 1983.

The beauty of the exhibits is breathtaking (a book is available for those not able to make the pilgrimage) but of additional interest to the collector are the 'purchase books' kept by Sir William. These hand written entries show the date of each purchase, a brief but comprehensive description from whom the item was acquired, its price, date of delivery, insurance, and whether photographed. There is a final column which Sir William initialled when everything was 'in order'.

The collection contains no scales, but there are three weights, pictures of which appear on these pages. *(By courtesy of The Burrell Collection, Glasgow Museums & Art Galleries).* ▷

FIG 1. Duck-shaped weight with the head of the duck (chipped) lying on its back, and the outline of the bill incised. Stone, Ht 37mm length 70mm, weight 487.1g. Stone, Assyro-Babylonian 800-600 BC.



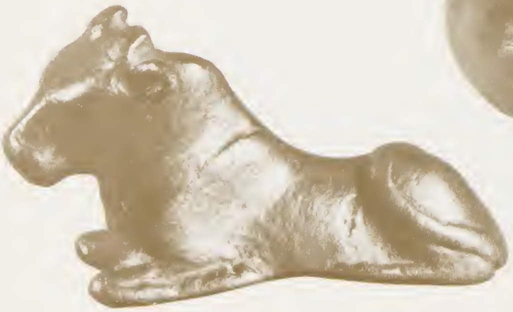


FIG 2. Figurine of a bull. The mass of 88.2g indicates use as a weight. Ht 34mm, length 58mm. Leaded bronze, Levantine or Egyptian, c.1400-1200 BC.

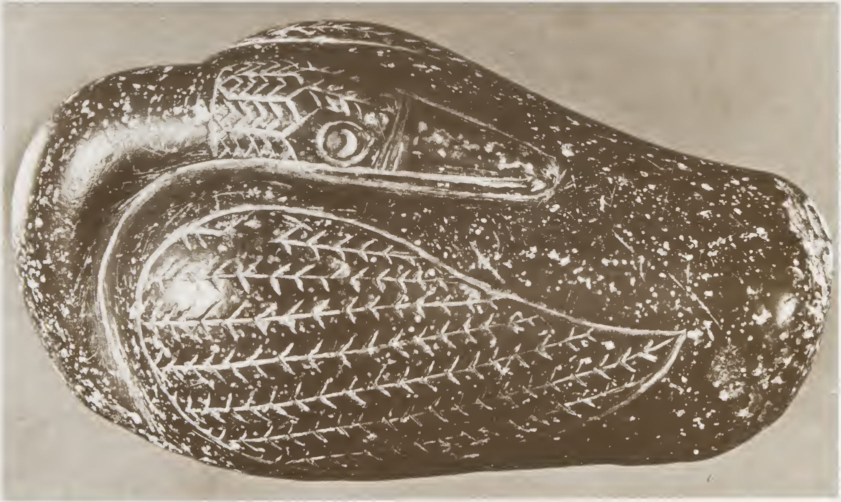


FIG 3. Duck-shaped weight with its head lying on its back, feathers incised with herring-bone patterns. Eyes originally had inlays. The stone shows chipping which is probably due to later use as a hammer. *The decoration is a later addition*. Stone, Assyro-Babylonian (?), c.5000-2000 BC Ht 64mm length 152mm.

Weights & Measures Standards in the UK

BOB HOLDAWAY

"How do you know your weights are correct?" All inspectors of weights and measures will have had this question directed at them on one or more occasions in their working life, whether it be by a truculent trader whose weights have been rejected by the inspector, or by some curious visitor to his office who is attracted by the sight of immaculate sets of weights and measures scintillating in a spotless mahogany press (cupboard).

The short answer, that they are checked periodically by officers of the Board of Trade against their standards, which in turn are compared at regular intervals with the Imperial Standards, is generally sufficient to satisfy the questioner. This article will answer the question in greater depth and illustrate the forward thinking of those who initiated the system of comparison nearly two centuries ago.

Before going into such detail, perhaps a few words on the purpose and progress of what is known as the weights and measures, or consumer protection service, together with a little historical background, would be appropriate.

Laws relating to weights and measures have been incorporated in the statutes of this country from the earliest times. Magna Carta (AD 1215) decreed that 'One measure of wine shall be through our Realm, and one measure of Ale, and one measure of Corn... and it shall be of weights as it is of measures.' The earliest recorded law which insisted upon uniformity was passed in the reign of King Edgar, about AD 965, when he decreed: '...and let one money pass throughout the King's dominion; and let no man refuse; and let one measure and one weight pass such as is observed at London and Winchester'.

The cornerstone of all subsequent weights and measures legislation has been the requirement that the same weights and measures shall be used throughout the United Kingdom, the intention being that the pound weight, the yard measure and all derivations thereof, should be the same value in whatever area of the country they are used.

Owing to lack of adequate enforcement in many parts of the United Kingdom, this ideal was never fully achieved until the end of the nineteenth century. Unfortunately, it was not only enforcement that was haphazard or even non-existent. A number of local authorities were criticized by the Warden of the Standards, in his annual reports to Parliament, for failing to submit their standards for comparison within the statutory time limit.

The Industrial Revolution, commercial growth, the opening of communications by road and rail, and the emergence of county councils as units of local administration, emphasised the need for a better standard of service to the community.

The Weights and Measures Act of 1889 recognized these shortcomings. It empowered local authorities to make regulations with respect to the verification and stamping of weighing instruments. It gave the Board of Trade more overall responsibility for overseeing the manner in which local authorities performed their duties, and, perhaps most importantly, the Act required that the inspectors should be qualified by examinations held by the Board of Trade. This more professional approach resulted in an immediate improvement in enforcement and was the firm basis for the service we know today.

We will now examine the procedure, laid down by Parliament, which ensures the accuracy and legality of the Local and Working standards which are in the custody of a local authorities chief inspector.

The fundamental units of the British system of weights and measures are the yard measure and the pound weight, once known as the Imperial Standard Yard and the Imperial Standard Pound. From them, all other denominations of weight and measure are derived, including measures of capacity.

These standards were recognized by an Act of 1855, following the fire which destroyed the Houses of Parliament in 1834, when the Imperial standards of weight and measure were also destroyed (see EQM pp.390-94). The Troy pound of 5760 grains which had been made in 1758 and had been the National standard of weight (by which the Avoirdupois pound was defined), was now superseded by the Avoirdupois pound of 7000 grains (by which the Troy pound was now defined). The Troy pound, as a denomination, was finally abolished in 1878.

The Imperial standard yard is a bronze bar, one square inch in section, maintained at a temperature of 62 degrees Fahrenheit, supported on bronze rollers to avoid flexure. The bar is 38 inches long, and, near to each end a cylindrical hole is sunk, the distance between the centres of the two holes being 36 inches. At the bottom of each hole is inserted a gold plug on which there are cut three fine lines at intervals of 1/1000 inch transverse to the axis of the bar, and two lines parallel to the axis of the bar. The length of the Imperial standard yard is given by the interval between the middle transverse line at one end and the middle transverse line at the other end of the bar, the part of each line which is employed being the point mid-way between the longitudinal lines.

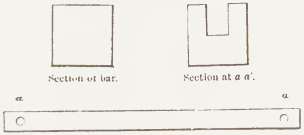


Fig 1.—Present Imperial Standard Yard, 1844.

Total length of bronze bar, 38 inches; distance *a a'*, 36 inches, or the imperial yard; *a a'*, wells sunk to the mid-depth of the bar, at the bottom of each of which is inserted a gold stud, having the defining line of the yard engraved on it.

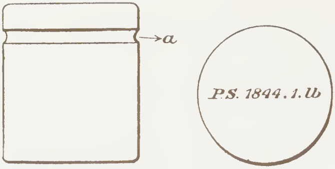


Fig. 2.—Imperial Standard Pound, 1844.

Platinum pound avoirdupois, of cylindrical form, with groove at *a* for lifting the weight.

The Imperial Standard Pound is made of platinum, the form being that of a cylinder nearly 1.35 inches in height and 1.15 inches in diameter, with a groove around it for insertion of the ivory fork by which it is to be lifted. It is marked PS 1844 1 lb.

There is no Imperial standard measure of capacity. The gallon is defined as containing ten Imperial pounds weight of distilled water weighed in air against brass weights, with the water and air at the temperature of 62 degrees Fahrenheit, and with the barometric pressure at 30 inches.

As befits their importance, the Imperial Standards are guarded with almost tender solicitude. They are placed in specially constructed dust and fire proof boxes, and kept in the strong room of the Standards Department of the Board of Trade, where a constant temperature of 62 degrees Fahrenheit is maintained.

As a safeguard, in the event of another disaster damaging or destroying the new standards, four copies of the standards, known as Parliamentary Copies of the Imperial Standards, were constructed at the same time and deposited at the following places: Royal Mint; Royal Society of London; Royal Observatory at Greenwich; and the New Palace of Westminster (Houses of Parliament). A fifth set was added later and deposited at the Standards Department of the Board of Trade.

The Board of Trade were required to cause the Parliamentary copies (with the exception of those immured in the New Palace of Westminster) to be compared once in every ten years with each other, and once every twenty years with the Imperial standards of measure and weight.

The Weights and Measures Act of 1963 redefined the basic units of weight and measure as being the pound, the yard and the kilogramme and the metre from which all other units are derived. The yard and the pound are now defined by reference to the metre and the kilogramme, thus enabling a constant mathematical relationship between the Imperial and metric units to be maintained. In the case of the yard, there is a constant absolute value because, by international agreement, the metre has been defined by reference to the constant light wavelength of the atom of Krypton 86. The kilogramme is an inviolate weight, defined by reference to a piece of platinum, known as the International Kilogramme.

The use of the term Imperial Standard has been discontinued and these standards are now known as United Kingdom Primary Standards.

The new definitions involve slight changes in the value of the yard and the pound which means that the yard is now approximately one ten-thousandth part of an inch longer, and the pound is one thousandth part of a grain lighter:

The Yard is 0.9144 of a metre
The Pound is 0.453 592 37 of a kilogramme

Parliamentary copies of the primary standards are now known as authorized copies and still kept in their original places. However, the ten-yearly redetermination has been discontinued, and the determination of these standards is now at the discretion of the Board of Trade.

So much for the primary standards. Now to consider the secondary standards of weight and measure which are called Board of Trade standards. Only weights and measures of the denomination of a Board of Trade standard can be stamped for use for trade. There are well over 100 permissable denominations, and they are required to be compared with the authorized copies of the Primary standards from time to time, at intervals not exceeding five years.

The Board of Trade has the power to provide or replace standards from time to time, that is, add new or abolish old denominations. Recent casualties include the apothecary system of weights and measures, the bushel, half-bushel and peck, and the rod, pole and perch.

The next step down the ladder are what are commonly called inspector's standards, more correctly described as Local and Working standards. These are the standards that have a direct relationship with the traders' weights and measures that are in daily use, and the standards to which the question "How do you know your weights are correct?", is directed.

Local standards are copies of the Board of Trade standards and are provided by local authorities for the use of their inspectors of weights and measures. To be deemed legal, they have to be verified by comparison with the Board of Trade standards and reverified within a period of 10 years in the case of measures, and 5 years in the case of weights.

Local standards are the master set and used only for checking working standards which are the weights and measures an inspector uses for testing traders' weights and measures, and which consequently bear the wear and tear of everyday use. This comparison takes place once every six months and is carried out by Weights and Measures staff at local level.

Local standards are never used for the direct comparison of traders' weights and measures, and are therefore only handled 10 times in the case of weights, and 20 times in the case of measures, between the statutory re-verification by officers of the Board of Trade. They are handled with great care - never touched by the naked hand - a chamois leather square

There are, in all weights and measures departments, a number of sets of working standards; often each inspector has his own set, so there are literally hundreds of weights and measures to be compared every six months - a very labour-intensive duty. To take one example, imagine testing 5 tons of 56 lb weights (200) many of which would require adjustment, particularly if they had recently been used for testing weighbridges. Placing 56 lb weights on each corner of a long-platformed weighbridge does not encourage gentle handling and bits of weight get chipped off. Fortunately for today's assistant, technological advances have brought into existence weighbridge testing units comprising large standards of up to 10 cwt, together with mechanical lifting tackle, which, so far as testing weighbridges is concerned, have made 56 lb weights redundant.

Such a comparison of weights is recorded in the Record of Standards book, the Chief officer duly recording the fact that the comparison was made within the six monthly statutory period.

So, between a trader's weights or measures and the Primary Standards, there are four further categories of standards. If the chain, by way of the time limit for comparison, is broken at any stage, then verifications or inspections made by an inspector would be illegal.

To recapitulate the comparison procedure:

ITEMS TO BE COMPARED	STANDARDS OF COMPARISON	PERIOD	OFFICIALS CONCERNED
Trader's weights and measures	Working Standards	At least once every 12 months	Inspectors of Weights & Measures
Working Standards	Local Standards	Every 6 months	Inspector & Staff. Certified in the Record of Standards book.
Local Standards	Board of Trade Standards	Weights every 5 years. Measures every 10 years.	Board of Trade Officers. Indenture of Reverification endorsed & signed by Head of Standards Dept.
Board of Trade Standards	Authorized Copies of Primary Standards	Every 5 years	Board of Trade Officers
Authorized Copies of Primary Standards	Primary Standards	Every 20 years	Board of Trade Officers often in presence of Senior scientists and a Minister of the Crown

or chamois leather gloves being a favourite method of handling local standards. When not in use, they are carefully cleaned and placed in a mahogany press (cupboard) lined with baize loosely laid, the material being acid-free. The press must be fitted with glass doors. The inspector is required not to allow any standards and balances in his charge to pass from under his control.

Regulations dated 1907, required new Avoirdupois local standards to be of spherical shape with a knob or handle, and to be made of gun-metal or hard brass. Existing bell-shaped standards made of bronze were allowed to remain in use. Any necessary adjustment to weights would be carried out by a specialist firm; for example, a small hole would be drilled, the necessary amount of lead added, and the hole then capped with gunmetal or hard brass. A large open adjuting hole, showing the lead, would not be permitted on a local standard.

Initially, if correct, local standard weights and measures are stamped by the Board of Trade officers, the mark being the Portcullis, Crown, Royal cypher and the date. Subsequent re-verifications are also dated. Local standards are provided with an indenture of verification (a paper document) naming the inspector in whose custody they are kept. An indenture is periodically endorsed upon each statutory re-verification and signed by the responsible officer at the Board of Trade.

Surplus, old, or often repaired local standard weights were generally converted into Working Standards. The indenture for any such weight or sets of weights would be cancelled. As a working standard, there would be no bar to an open adjusting hole, indeed, a convenient means of adjustment is imperative on weights that need periodic adjustment due to wear and tear.

So, we now come to Working Standards - weights and measures used by an inspector for checking traders' weights and measures. As already mentioned, these standards are compared with the local standards every six months, and any necessary adjustment is made there and then by the staff. Such weights and measures can be converted local standards, or specially manufactured weights and measures. They do not require approval from the Board of Trade. The shape of local standard weights, unlike the shape of trade weights, is not restricted, so, for convenience in carrying, square blocks and flat square shapes are favoured. Denominations and materials of construction, however, are the same as those applied to traders' weights.

Incidentally, on the *verification* of weights and measures (that is the testing of new or repaired weights and measures which require stamping) the inspector must compare such weights and measures with the corresponding denomination of a local or working standard, e.g. a 7 lb weight must be compared with one standard bearing the denomination 7 lb, and so on. There is no such restriction on the *inspection* of weights and measures which already bear, or should bear, a verification stamp, and multiples of denomination can be used. It must be remembered that tolerances are much stricter on verification than on inspection. It must also be realized that no weight or measure is perfectly correct - only the primary standards and their copies can claim to be inviolable. Correct means therefore 'correct within the errors or tolerances laid down by regulations'.

Recent years have brought about the inevitable minor changes. Inspectors of Weights and Measures are now known by the public, if not by legislation, as Trading Standards Officers. The Board of Trade has become the Department of Trade and Industry; the metre is now defined as the distance travelled by a light beam in a vacuum in 1/29979245th of a second, and rumour has it that local standards are not always treated with the reverence they once enjoyed. Basically, however, the above procedure has stood the test of time and is still applicable today.

Letters

CONNOR - SHORT MEASURE ?

The following helpful analysis has been received from Albert Rangeley, adding further observations to the Review of R.D.Connor's book 'The Weights and Measures of England' (see EQM p.1074):

It is a carefully researched and well documented chronicle of enactments relating to weights and measures. It places under one umbrella the historical aspects, making it a necessary addition to one's library, but it is a publication which falls short of modern-day requirements - i.e. a book to illustrate and describe the practical effects of legislation. Connor fails to deal with the following effects and artefacts:

One of the practical effects was the vast importation, during the 18th century, of wares from the Westerwald region of Germany in response to the Act of 1700 for *Ascertaining the Measures for retailing Ale and Beer.* These measures had an applied seal purporting to be an official seal of WR, AR and GR. Similarly, Staffordshire produced salt-glazed wares with the incised, or 'scratch' blue decoration bearing an applied seal of GR during the period around 1760.

After Imperial legislation (1826 - 36), 'Mocha ware' appeared with applied seals and this continued to c.1880 when the now familiar sand-blasted VR verification mark superseded the seal. ER and GR verification marks continued until c.1914.

Huge quantities of ceramic tavernware appeared towards the end of the 19th century, amongst which was 'Bristolware', made at the Kilnhurst Pottery in South Yorkshire. These measures, in brown dipped stoneware, bore various types of verification marks, varying from a moulded Imperial seal, to sand blasted marks, to lead seal affixed through holes drilled into the body of the tankard or jug. In fact, one manufacturer affixed seals of wood and obtained a patent to cover this.

Pewterware and verification marks have been amply covered by many authors and no further comment is necessary. ▷

Wooden yardsticks were produced with branded verification marks on the face and/or the ends, until, at a later date, they were fitted with brass ferrules to lessen the perpetration of fraud.

Volumetric dry measures made of coopered oak or steamed bentwood are worthy of mention, along with the smaller ones turned from the solid wood on a reciprocating lathe in order to incorporate the handle. Some of the latter measures had a protective rim in brass or pewter, and they bore branded verification marks, sometimes headed 'SM' for 'strike measure'. There was also a vast array of measures made of brass, copper and glass.

The paragraph relating to the Founders' Company indicates that the role of the Company in stamping brass weights ceased in 1889, but it is recorded in the accounts that nine weights were stamped in June 1908, at a cost of one halfpenny each. This was the last entry in the books in respect of such work. As late as 1976, the Company elected a 'Sizer and Searcher', but this was merely in accordance with custom.

It is inferred, on page 332, that the bond of £100 for an Inspector of Weights and Measures was actually deposited, but this was merely a form of recognizance and the money would be called for in case of impropriety on the part of the Inspector, or his failure to perform his duties correctly or improper matters in relation to the collecting of stamping fees.

Regarding the 8 lb stone, page 338, butchers' meat has, for the most part of this century at least, been weighed in pounds not stones, hence the capacities of butchers' steelyards and carcase weighers being mainly in centals. The most popular capacity was 300 lb, in the case of a steelyard, and 500 lb and 1000 lb in the case of carcase weighers. I conjecture that while the steelyards may have been figured every 8 lb, they would not have been interpreted as 'stones'. They would have been permitted to be used but the resultant reading would have been in pounds. I cannot accept that invoices up to 1939 would show butcher meat in stones of 8 lb - the amount would be stated in pounds, even though weighed on a machine with 8 lb graduations.

It is stated on page 333, that of 731 Inspectors in Scotland, Wales and England in 1870, some 476 were police officers. It is worthy of note that one authority, the City of Chester, specifically excluded police officers from perfoming this function.

On page 364: A hogshead, when related to ale or beer in Imperial terms, is 54 gallons. Page 368: A pottle is half a gallon in Winchester Measure. Page 362: A Coomb (coom) was also 4 bushels in Winchester Measure, prior to the Imperial Standard.

Albert Rangeley

EDITOR'S NOTE: In spite of these omissions, the book is a most important documentary study which is both accurate and fascinating.

ISASC

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PAGE 1162

Cover Picture

We should all have happy memories of Michael enjoying himself. In this photograph, he had just been asked which was the scale he most desired, and he had immediately pointed to the pendulum with cog & ratchet to a vertical pointer. I was laughing because that is the perennial question when looking at an exciting collection, and also because I was so pleased to see our friend Utz Schmidt, whom we had not seen for about eight years.

Michael would not have approved of my using EQM to talk about him. EQM was the vehicle for knowledge of scales and weights only. I felt, however, that just this once, we should all acknowledge that he was the lynch-pin around whom the knowledge flowed, and that we should have a permanent record of him.

Diana Crawforth, Editor

MICHAEL ARNOLD CRAWFORTH- 7.11.32- 28.8.88.

Michael was born in Grimsby, England, into a large, extrovert family who were policemen, stone masons, farmers and shop keepers- respected for their probity, their Christianity and their contributions to their community, but not exceptional. So where did this shy, modest academic come from? His mother was the person who encouraged him to question assumptions, who allowed him to sit and make things, who prevented his boisterous relations from taking him out for a "nice game of football",who discussed his ideas and helped him to think clearly.

As a teenager he joined an aero-modelling club, building and flying wire-controlled 'planes competitively. His skill at both gained him a place in the British team for a short time, until somebody knitted the control-wires and his group had no 'planes with which to compete- a common hazard in that sport!

After school he was pushed into training as a power-station manager, but the giant turbines held no charms for him, he hated managing people and he disliked having to prove that he was "one of the boys".

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111 North Canal Street • Chicago, Illinois 60606 • U.S.A.

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Editor — Diana Crawforth
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As soon as he was old enough, he joined the Royal Air Force as air-crew on fighter 'planes. He was a radar-navigator, flying for four years with Eric Drinkwater (who recently re-entered our lives as our elder son's future father-in-law) and for eight further years with two other pilots, without ever doing Active Service. He liked the planes, hated the social events and always volunteered to be on stand-by on Mess nights- when all right-minded officers put on their best uniforms to over-eat and over-drink. If he could not avoid the dinner, he took his clarinet or his saxaphone and spent the evening doing his best impressions of Sidney Bechet, Louis Armstrong, the Hot Club de France, the Red Hot Peppers, Bix Beiderbecke or King Oliver.

As a well-paid young officer, he could afford extravagant sports cars, culminating in a Porsche which he drove in amateur driving-skills competitions, converted it from left-hand to right-hand drive, and spent much time upside-down lovingly cossetting the engine. At the time he sported an enormous red moustache (which I had the good fortune never to meet) and I reckon he must have unnerved many a countryman!

He also indulged in exceedingly expensive, high-fidelity gramaphone equipment and learned to enjoy the Classics, having never heard them in his youth. He loved quartets, quintets and chamber music, particularly for wood-wind;- opera and symphonies by Beethoven, Mozart, Schubert and Rossini;- nothing difficult, but intensely pleasurable.

As flying was a brief, nerve-racking event, which could not be practised eight hours a day, he had plenty of spare time to fill. He drew, painted and sculpted, tried calligraphy, life drawing and pottery. The pottery class was where our lives crossed. It took only a few weeks to know that we wanted to spend the rest of our lives together, and we were married within three months;- the best decision we ever made!

Together we discovered Indian classical music, Ravi Shankar and Ali Akbar Khan, the sitar, the tabla and the incredibly long convoluted mood-music. Years later, the Beatles made popular very simple Indian music, but they trivialised music that was complicated, delicate and very difficult to our simple Western ears.

Michael yearned to own African Tribal Sculptures but with two baby boys, his salary no longer seemed so luxurious. He copied the carvings he loved the most, using African woods, and producing excellent facsimilies. His pleasure in their emotional impact was enhanced by his attempts to reproduce their distortions vividly.

At 32 years old, he had to make a decision about his future;- whether to sign on for twelve more years in the RAF or to risk going back to college to train as an industrial designer- only about one in twenty trained got a job as a designer. He had great trouble persuading the best college (for his subject then) outside London to accept such an old man! It seems incredible now to think that the college considered him ineducable at 32, but they changed their attitude completely when they saw Michael's work. Michael got a B.A. honours degree and a job designing cranes. Vindication!

But before we left Leicester, the BIG event, which passed by at the time without any frisson!I found a piece of kinetic sculpture for Michael's birthday, otherwise called a bilateral pendulum postal scale- but who knew that? He played with his "sculpture", showed it to his fellow-students and took it to my aunt's. Her husband insisted on giving us another one- a Hall's patent pendulum postal scale- and told us that we'd got the nucleus of a collection. We didn't believe him, we ignored the hint, we wasted three or four years before we crept furtively into our first antique shop to enquire about the scales in their window. Well- we wouldn't have gone in at all if they hadn't had the scales prominently displayed. Slowly the bug bit, we gained confidence, we marched blithely into antique shops demanding to be shown all their scales, we mastered the art of good-humoured haggling and even learned to say "No, it's too much". Mind you, Michael has frequently wished that he could turn the clock back and say "Yes, I'll never see another one, so I'll pay".

The crane factory in Sunderland took all his brains and creativity. He was their ergonomics expert, their ideas man, their noise-control specialist, their model maker and the go-between calming the directors and the shop-floor practical men, who could rarely see each others' point of view. He helped to compile new legislation for the E.E.C. to compel manufacturers to produce safer, quieter cranes. He had no department to manage, but he had great responsibility- the perfect job for Michael.

As he became more familiar with his new profession and could relax, he started to catalogue our scales, sort out his thoughts on these varied and puzzling objects, do research in every spare minute and in every holiday, correspond with strangers and visit other weird people who owned scales. We invited Bob and Margie Stein to visit our house, and we tossed about the idea of starting a society, as, between us, we could envisage about 25 people who might join. It seemed a worthwhile enterprise, Bob had the essential organisational skills, the office back-up, the white-hot enthusiasm and the drive. Michael thought that he could contribute a few historical facts and help people with simple enquiries. ISASC was born.

Michael went to Portobello Road (wives with two little boys didn't go) and bumped into a fascinating American who was also rivetted by a folding guinea balance. After two hours talk the American wanted to know whether Michael knew the enthusiast who lived in Sunderland, with whom he corresponded. Well, yes, intimately, he could say! Michael had been writing to Norman Sturgess regularly, and at last they met- I think they were both so reluctant to meet strangers that neither would voluntarily have organised a meeting! But from then on, we arranged to meet every six months, mid-way between Norman's USAF station and Sunderland, to spend the day discussing the latest aquisitions, examining the details, arguing about provenance, period and function, developing theories, evolving a vocabulary with which to discuss the scales, sharing knowledge and enhancing each other's pleasure. Without Norman, Michael would not have progressed to become the scholar he did, or write his book, "Weighing Coins" so soon.

Increasing numbers of people wrote to Michael, averaging about 200 letters a year.Organising the results of our research took up more and more time and effort. Equilibrium was started, with Michael as trainee editor. He was pleased to do this as he felt very passionately that people should share their knowledge and help each other along. As photographs inform collectors in a different way from drawings, Michael taught himself to take shots of tiny things, shiny things and shots where part of the object was in deep shadow. Then he learnt to print them, bring up pale areas, soften dark areas and harden grey negatives. He made special equipment to fit into our little bathroom, and shut himself in for many whole Sundays- coming out blinking occasionally with a pile of wet photographs. ISASC paid for chemicals and paper, but never for the back-ache, the frustration, the lost rest period, the effort and will-power used. Michael said that it was worth it, to get the best available pictures for EQM.

Michael spent endless evenings drawing the illustrations- another slow, painstaking job, demanding concentration and commitment. You may think that he could toss off a drawing quickly, but most drawings for publication took at least an hour each and were only amalgamated on the page later. Michael blessed the invention of the photo-copier, its reducing and enlarging facility and the spray glues developed for photographers.

He had never written anything except school essays and examinations before embarking on EQM and "Weighing Coins". His style evolved slowly and painfully but he considered it so important to communicate lucidly that he would work on a passage many times until he was satisfied that it expressed exactly what he intended. He was never confident of his abilities, and always passed every letter, article,paper or chapter to me for analysis, comment, alteration or additions. Only the invention of the word-processor lightened the burden of writing .

In 1984 Michael was invited to research the British Scientific Instrument Making Industry from 1700 to 1800, which led in turn to the compilation of a list of instrument makers from 1550 to 1850 (Project Simon). This involved another gamble. Was the crane industry dying in Britain? Was it worth moving to an area where houses were twice the price, for a job lasting three years only? Would we be able to live on a research grant in an area where there is a surplus of teachers and I would not get a professional job? Michael was excited by the prospect of doing full-time original research, of concentrating all day on the residue of facts left by erratic history, of building a picture from these facts and by the opportunity to alter people's concepts of the Instrument Making Industry. He accepted the offer and we moved to Oxford. We never regretted our decision. Michael loved having me working alongside him, loved working at home and was entirely satisfied by his new profession. He published papers (long articles) in academic journals, lectured to professional historians, curators of museums and collectors of scientific instruments, and increased our range of friends even further than ISASC had.

As a man of Scots origins, Michael bought a kilt in 1986 and surprised all his colleagues by wearing it at most events. Was this the shy, retiring man they knew, who now turned ladies' heads and caused murmurs of delight? We heard of a beginners' class for Scottish Country Dancers and we nervously began. Michael had two left feet, couldn't remember the sequences and spoilt many an elegant dance for the other seven in the set. He was determined to master it though, practised every day and within a year became a very good dancer. We went dancing at least twice a week, and more if we could find another dance. He bought two more kilts, designed and made a lovely Celtic influenced sporran and kilt-pin, lost 28lb., and collected the instructions for over 1100 dances.

On a trip to the Edinburgh Archives we awarded ourselves a day of dancing school, followed by a social dance. Michael danced vigorously for seven hours, and made sure that I would dance "Red House Reel" with him- it involved a flirtation between the partners and he wanted to flirt with me. We danced it very creditably, he smiled at me in delight, then collapsed unconscious, his heart stopped and two nurses made valiant attempts to revive him. The cause of death proved to be an acute allergic reaction, leading to a broncho-spasm.

So died a man of passionate enthusiasms, of great intellectual ability, of integrity and creativity, and a skilled craftsman; a husband of gentleness, consideration and loving-kindness; and a father of two sons who have inherited many of his qualities.

Review

Nesting weights, Einsatzgewichte and Piles a Godets.

This paper-back is a catalogue of the Nested Weights in the Edward Clark Streeter Collection of Weights and Measures. The ten page introduction is concise but useful. The catalogue of the 88 sets is extremely detailed, includes a good photograph of each set, and drawings of most of the verification marks. There is a full bibliography, the only obvious omission being Numismatica, Wein catalogue, Auction X, 1975.

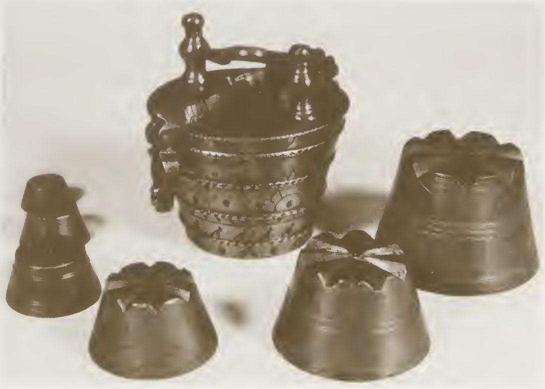
Catalogues of this degree of detail are a wonderful addition to the collector's library. The framework of headings helps with the analysis of ones own collection and makes possible comparisons with those in the Streeter Collection.

The "usage type" heading has been divided a little arbitarily between bullion and coin usage, where the weights were for French gros and onces, or for English troy ounces. The scales could have been used to weigh bullion and/or coins, and the total mass of the weights may be the only clue as to which was more probable. Personally I would reserve the term "coin weight" for any one weight which balances against any one coin, for example, English nesting weights, circa 1700, to weigh 5 shillings, 2s, 1s and 6d. coins.

The "theoretical mass" is not the theoretical weight of the whole set in every case. Sometimes, for example, no. 75 and 77, the author has made the unwarranted assumption that the set started off with a bigger cup which is now missing. How can we know? Little sets with a total weight of 2oz or 4oz were not uncommon in England, judging by the number that appear in antique markets. They may have been bigger, but there is no evidence that they were.

The "numerical breakdown" has to be used with extreme care, as the first number is that of the weight of the total set, not that of the biggest weight. The fascinating screw-on lid set, no. 42, has an interesting numerical breakdown which bears no relationship to the actual mass. As far as I can understand it, the total mass is 30 oncies, comprising the lid of 6, the housing 12, the biggest cup 6, then 3, 2, ½, ¼, ⅛ and ⅛ oncies, which permits the weighing of all numbers up to 30 oncies.

These nesting weights were made in Nurenberg for the French. They weigh 8 marcs. The maker's mark is a cock, but, not having seen the mark, it is impossible to say whether the weights were made by Tobias Martin Kolb, working 1760-1785.



L. Uit den Bougaard collection

The "maker's marks" are of very limited use, being described only;- a pity as the makers are the very subject of the catalogue. It is a nuisance to have to refer to Lockner, Kisch, Lavagne, Houben etc, to find out who the maker might be.

The "verification stamps" are extensively shown, a gold-mine for those interested in inspection, but the author includes some where the mark is partially erased and then drawn by Mrs. Danforth as question-marks. A dotted line or nothing should have been shown in the mark, as a question-mark is misleading.

By "history" the author means provenance, in this book.

The "comment" has many useful remarks, references and comparisons to help with further research. I am worried by the implication that the weights in French coin-scale boxes were made by the scale-maker. I would have expected the scale-makers to buy in the nesting sets they needed from specialist weight-makers as they did in England.

All other headings;-century, place of manufacture, place of use, numerical system, adjustments, form of lid, form of house, decoration, dimensions and condition; pack in a phenomenal amount of information, which the author must be admired for including. It looks simple, but it takes months to compile all the details accurately, and to measure every cup, as anyone trying to catalogue his own collection will know, and he probably won't have 22 headings with which to cope.

I needed a chart for quick reference to the weight systems used in each country. I had forgotten how many gros in an once, and how many ottavios in an oncie. Again, I had to resort to Kisch's book, so I recommend the addition of a table of units for each country mentioned.

This is rather a long review, but with good reason. The book is an important addition to the literature, it will help all collectors to catalogue their nesting weights, its methodical approach should be imitated, and the book packs thousands of facts into a neat volume.

The author is to be congratulated on her scholarly approach and ISASC members are recommended to buy this book. DFC.

"Nesting Weights, Einsatzgewichte, and Piles a Godet" by Ellen Zak Danforth. Transactions of the Connecticut Academy of Arts and Sciences, volume 50, March 1988. 117 pages. 80 photographs. 187 inspectors stamps. Published by Archon Books, Hamden, Conn. USA. Price to be announced in the next issue of EQM. ISBN 0-208-02220-1.

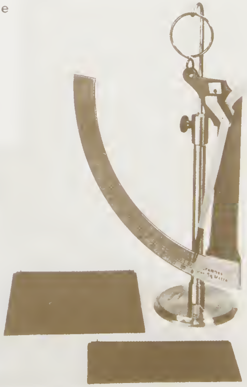
Yarn, Cloth & Roving Scales 2

MICHAEL CRAWFORTH

A portable quadrant was marketed by Casartelli, Fig 15 it being a miniature version of the Lancaster quadrant, with very similar characteristics. (The same design, with different graduations, was used for testing paper samples).

Perhaps the most unusual balance was Thorp & Tasker's Yarn Tester which had an extraordinary combined beam and spiral spring made from a filament of glass, Fig 16 No adjustment could be made to the beam, so the instrument was set to zero by moving the graduation plate up or down. This balance gave a direct reading of the counts from a 20 yard sample of yarn placed on a hook half way along the beam. The instrument was made by Casartelli of Manchester.

FIG 15. Casartelli's pendulum balance 210mm($8\frac{1}{2}$ ins) tall. The blackened brass templates have spikes to hold the cloth, and top plates to trap the cloth, thus enabling the person cutting the cloth to get an accurate sample. Dismantles to fit into a blue velvet-lined leatherette case.



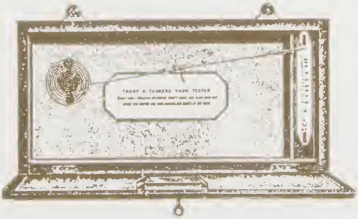
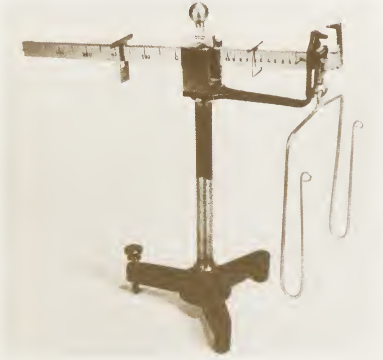


FIG 16 Thorp & Tasker's Yarn Tester, made by Casartelli of Manchester. The beam and spring were made of glass which may explain why the author has not seen one.

In Paris, the firm of L.Exupere made a steelyard balance for determining the weight per square metre of a sample of cloth (or paper). A sample was cut to the size of the template supplied, and placed in the rack which looks rather like a letter rack. Then the weights were adjusted to achieve equilibrium in the normal way. The larger weight registered 0 to 500 grams, and the smaller weight 0 to 10 grams. This instrument was adopted by the French Customs who checked the weight of cotton goods shipped to France. According to Curtis (1) it was also used in England. Fig 17.

FIG 17. Exupere á Paris. 190 mm (5½ ins) tall. Beam, pillar and rider weights made of brass & the foot black-painted iron.



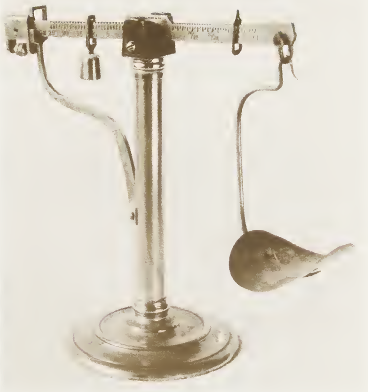


FIG 19. E & T Fairbanks & Co. Nickelled brass. 188mm (7½ inches) tall.

In America, Brown & Sharpe made a 'roving' scale in the form of a loose-weight steelyard, Fig 18 Ten loose weights were provided, 3000, 2000, 1000, 500, 300, 200, 100, 50, 30 and 20 grains. A sliding weight on the beam registered with graduations 0 to 20 grains x 1/10 grain. The counts were obtained from the weight by use of the tables provided. Various steelyard-type yarn and cloth balances were illustrated in Fairbanks' catalogues.

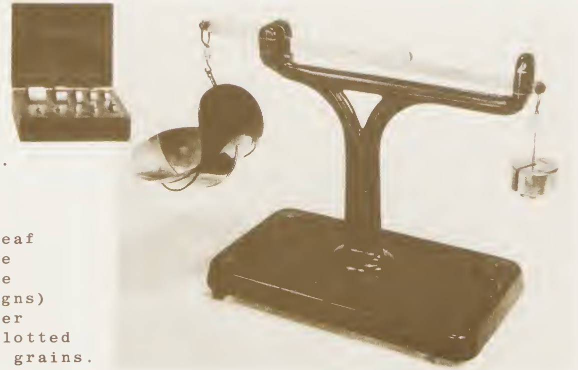


FIG 18. Brown & Sharpe Mfg Co. Providence, R.I. 170mm (7 ins) tall. Black painted iron with gold ivy leaf transfers at the corners & on the pillar. 0-100 (gns) using brass rider weight. Boxed slotted weights 20-3000 grains.

The example shown in Fig 19 is graduated in ounces x 1/32 oz, so was probably for determining the weight per running yard from a small sample. The weight in ounces was multiplied by the width of the cloth in inches, to give the weight per running yard. This design of steelyard appeared in its prescription scale form in Thaddeus Fairbanks' US patent No.207263 of Aug 20th, 1878. A later design, also based on a prescription scale (EQM p.73) was shown in the Fairbanks catalogue of 1906.

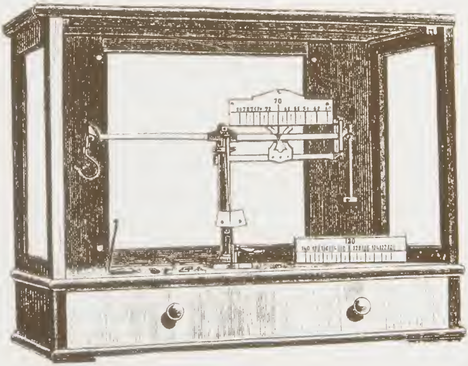
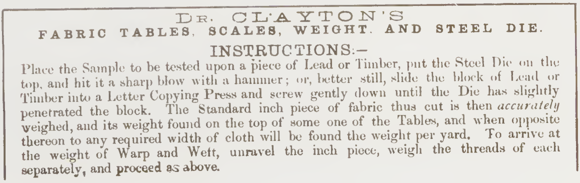


FIG 20. Illustration from Herzfeld's book of 1902.

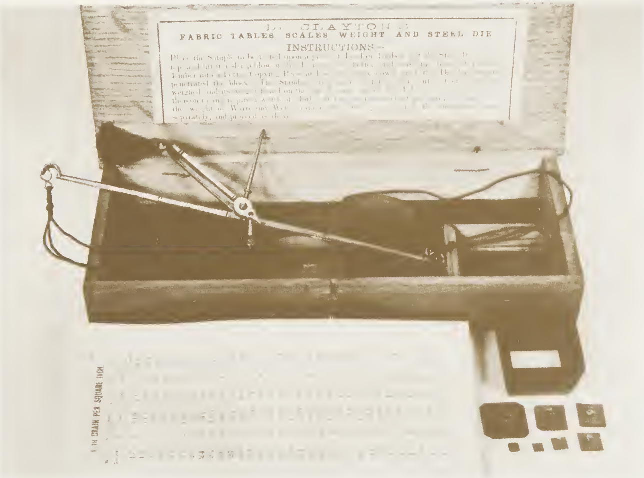
A loose-weight steelyard very similar to the Brown & Sharpe was illustrated in the 1926 catalogue of Henry Troemner of Philadelphia. It was described as a 'Yarn Scale Balance for ascertaining without calculations the counts of Cotton, Woolen (cut and run basis) or Worsted Yarns, using a different graduation of the scale-beam for each kind of yarn quoted, so as to comply with their standards of grading as to count or number.' The length of yarn used with this balance was 50 yards of wool, known as the 'cut' system. To convert to other systems a simple formula was used based on three ratios: Cut to Run system 300 to 1600; Cut to Cotton, 300 to 840; and Cut to Worsted, 300 to 560. Thus a reading of 40 Cut becomes 7½ Run, 14¼s Cotton or 21½s Worsted.



DR. CLAYTON'S
FABRIC TABLES, SCALES, WEIGHT. AND STEEL DIE.
INSTRUCTIONS:–

Place the Sample to be tested upon a piece of Lead or Timber, put the Steel Die on the top, and hit it a sharp blow with a hammer; or, better still, slide the block of Lead or Timber into a Letter Copying Press and screw gently down until the Die has slightly penetrated the block. The Standard inch piece of fabric thus cut is then *accurately* weighed, and its weight found on the top of some one of the Tables, and when opposite thereon to any required width of cloth will be found the weight per yard. To arrive at the weight of Warp and Weft, unravel the inch piece, weigh the threads of each separately, and proceed as above.

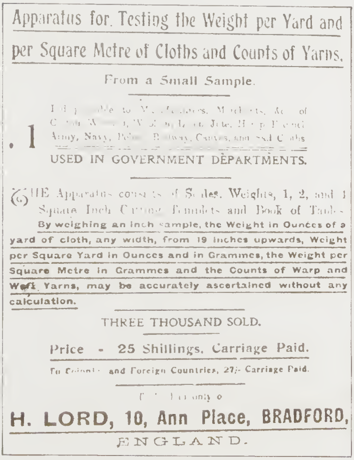
FIG 21. Dr. Clayton's fabric scales to be used with his tables 'To enable any person, without calculating, to ascertain from a small sample, the size of half-a-crown, the weight per yard of any textile fabric from 17 to 80 inches wide'.190mm.(8 ins) beam. 1x1 inch blued-steel die. One page of the tables book protrudes into the bottom of the picture.



Another form of loose-weight steelyard yarn balance was illustrated by Herzfeld (3), Fig 20. No information was given by that author for its use, but it appears to have alternative graduation plates for different ranges of counts, and corresponding weights to go on the hanger. Final balance was made by moving a sliding weight along the beam, where its position indicated the counts on the graduation plate. This type of procedure, used with an equal-arm balance, is explained in more detail below (see Knowles balance).

Conventional equal-arm balances were also used for yarn and cloth testing, especially in the laboratory, where precision balances provided much more accurate results than pocket scales, and the self-indicating scales so far described. Equal-arm pocket scales also had some popularity as shown by the balances of Horatio Lord and his successors, and in Ireland, of Dr. Frederick Clayton, who was a partner in the worsted spinners and manufacturers F.& J. Clayton. In 1887, Dr. Clayton published his *Fabric Tables with Scales, Weights and Steel Die* 'to enable any person, without calculation, to ascertain from a small sample, the size of half-a-crown, the weight per yard of any Textile Fabric from 17 to 80 inches wide; as likewise the weight of Warp and Weft therein'. The die referred to was a hollow square of blued steel with a sharp cutting edge at the bottom, Fig 21. It was placed over the cloth which was on a piece of lead or fine-grained timber. The user was then instructed to 'hit it a sharp blow with a hammer; or better still, slide the block of lead or timber into a Letter Copying Press and screw gently down until the Die has slightly penetrated the block'. Thus, use of the die provided a sample of cloth more consistent and accurate in size than was possible using a template and razor blade or scissors. However, it had the disadvantage that warp and weft threads could not be straightened out before cutting to size.

Dr. Clayton's tables ranged in weight of the sample from one eighth of a grain to ten grains, a table being provided for each increase of one eighth of a grain. The weights provided were 10,5,3,2,1, 1/2, 1/4, 1/8 grain, and the scale he supplied had an unusually long beam of 200mm (8"), Fig 21. In use, the sample of cloth was weighed to the nearest 1/8th grain. Then, after finding the weight at the top of one of the tables, the weight per yard of any width of cloth could be determined, in steps of one inch, from 17 to 80 inches. The tables show a remarkable range of weight for a square yard of cloth from 0.162 grain to 29.72 grains, the latter being 183 times heavier than the former. The book of tables was printed in a specially narrow format which just fitted inside the scale box.



Apparatus for Testing the Weight per Yard and per Square Metre of Cloths and Counts of Yarns.

From a Small Sample.

Indispensable to Manufacturers, Merchants, &c., of Cotton, Woollen, Worsted, Linen, Jute, Hemp, Flannel, Army, Navy, Police, Railway, Canvas, and Sail Cloths

USED IN GOVERNMENT DEPARTMENTS.

THE Apparatus consists of Scales, Weights, 1, 2, and 4 Square Inch Cutting Templets and Book of Tables. **By weighing an inch sample, the Weight in Ounces of a yard of cloth, any width, from 19 inches upwards, Weight per Square Yard in Ounces and in Grammes, the Weight per Square Metre in Grammes and the Counts of Warp and Weft Yarns, may be accurately ascertained without any calculation.**

THREE THOUSAND SOLD.

Price - 25 Shillings, Carriage Paid.

To Colonies and Foreign Countries, 27/- Carriage Paid.

[illegible] only o

H. LORD, 10, Ann Place, BRADFORD,

ENGLAND.

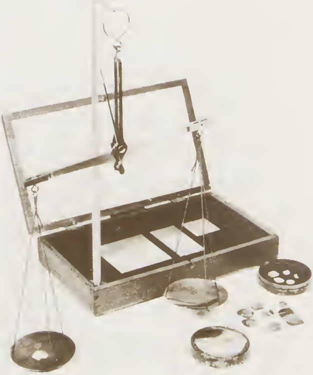


FIG 22. H. Lord's Apparatus. 260mm (10 inches) tall. Saffron lacquered brass beam. Aluminium pillar. Emerald green cords. Maroon velvet lined box. 1-20 grains brass. 1- 5 grains aluminium. The label shown on the left is stuck to the outside of the lid of the box.

Horatio Lord's scales were used in a similar way, except that the cloth was cut to the size of a template, Fig 22. The user was instructed to 'place the sample to be tested on a piece of cardboard, put a Cutting Templet on it; cut card and cloth round templet with scissors'. After weighing, the weight per square yard, or per square metre, was found in the book of tables provided. The label of the box of scales claimed that Lord's apparatus was used in Government Departments, and that over two thousand had been sold. The author's example is accompanied by a letter signed by H.Lord and dated February 28th, 1910. It was addressed to Messrs. Bradley Bros. and gives them two days approval - an indication of the speed and reliability of the Post Office in Edwardian times. The letter refers to a specimen test of cloth included with the letter, as a guide to working the apparatus. The specimen is stuck to a printed test form on which the tested values are written in red ink, in Lord's own hand.

The entrepreneurial versatility of Victorian businessmen is exemplified by the 1894 directory entry for Horatio Lord, for he was both journalist & merchant. His scales were, on the evidence of their distinctive design, imported from Germany where they were illustrated in the catalogues of Gottlieb Kern. The pillar for supporting the scales, and the templates for cutting cloth, were crudely cut from aluminium tube, rod and sheet, and it is easy to imagine Horatio Lord making these parts himself on the kitchen table!

In laboratories, normal apothecary and precision chemical balances were used for testing yarn and cloth with great accuracy. The author has seen examples by Oertling and by Avery with added labels of the firms Goodbrand, and Nesbitt, indicating their sale for use in the textile industry, Fig 23 As with pocket equal-arm balances, the counts or weight per unit area was calculated from the weight, or by use of tables.

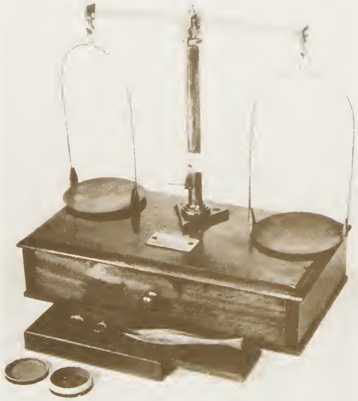


FIG 23. Oertling, London.240 mm (9½ inches) tall. 'class 1 to weigh 1 oz.'on the beam. Box labelled 'John Nesbitt, Machine Maker, 42 Market St Manchester.'

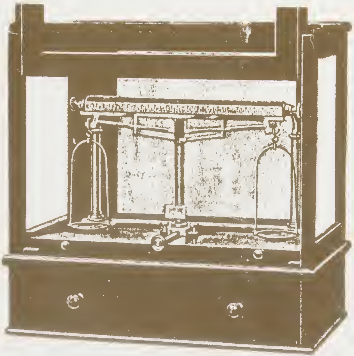


FIG 24. Knowles' Patent Yarn Balance made by Goodbrand of Manchester. The hexagonal bar was solid brass and was held up by the brass support pillars seen behind the pans. The fine beam was supported on the central pillar.

A special form of laboratory scale was patented by T.Knowles in 1883. This long-beam balance had, behind the beam, a hexagonal bar mounted on two pillars, Fig 24 Each face of the bar had graduations marked, respectively, A,B,C,D,E,F. Face 'A' had the heaviest range of counts, 20s to 40s, face 'B' had 40s to 60s, and so on, up to 120s. These graduations were used with corresponding weights, also marked A,B,C..etc, circular ones which were placed in the left pan, and square ones which were used on the rider bar at the top of the beam. In operation, a lea (120 yards) of cotton yarn was placed in the right pan, and the hexagonal bar was turned so that the expected range of counts was nearest to the rider bar of the beam. If this was face 'B', then round weight 'B' was put in the left pan and square weight 'B' was placed on the rider bar. The rider weight was then moved along the bar until equilibrium was attained. The graduation on the hex bar opposite the centre of the rider weight indicated the counts.

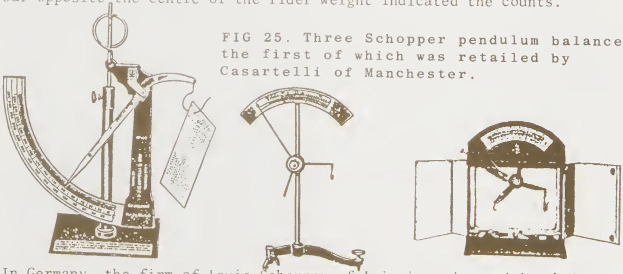


FIG 25. Three Schopper pendulum balances, the first of which was retailed by Casartelli of Manchester.

In Germany, the firm of Louis Schopper of Leipzig made pendulum balances for testing yarns, Fig 25 One of these was a pocket type based on the tripod stand of the familiar Maul letter scales. The other was a precision quadrant balance for weighing very short samples of yarn, enclosed in a case to protect it from dust and air disturbances. These balances were also used in England.

A most unusual yarn balance was described by Herzfeld (3), Fig 26. It was a form of movable load scale (MLS - see EQM pp.1026-35) using two beams. The secondary beam, shown on the left in Fig , was the means of applying the load and making adjustments. From it was suspended the skein of yarn to be trsted. A wheel at the end of this beam rested on the top of the weigh beam which was mounted on a sliding carriage. Thus, by moving the carriage to the left or right, using the knob underneath, the point of application of the load (i.e. the wheel) was moved along the beam until equilibrium was attained. An index line on the side of the carriage indicated the counts on graduations fixed to the case. This extraordinary balance had the glass case placed just around the beams, part-way up the supporting pillar.

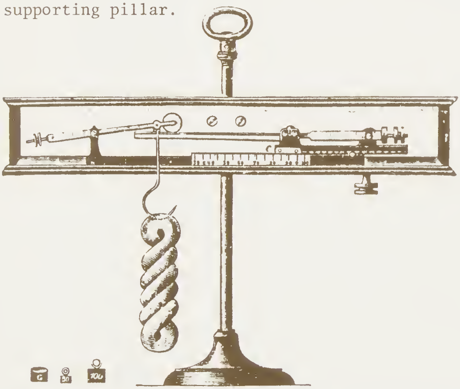


FIG 26. Illustration from Herzfeld's book of 1902.

Clearly, the weighing of yarns and cloths is a complex subject, which has been much simplified for this article, but some knowledge of the purpose of a scale and its weights, and the method of their use goes a long way towards explaining the special features observed, and generally enhances the pleasure of owning a yarn balance. The editor would be pleased to receive details of any different type or make of yarn balance which could be featured in a future supplement to this article.

With the author's grateful thanks for their assistance to D. Chitty, G. Chellingworth, B. Whiteman and others.

REFERENCES

1. CURTIS H.P. 'The Testing of Yarns and Fabrics', London, 1930
2. LOMAX James. 'Textile Testing' 3rd Edition, London, 1956
3. HERZFELD J. 'The Technical Testing of Yarns and Textile Fabrics' London, 1902
4. NESBITT LTD. John. 'Testing Yarns and Cloth' no date (c.1900)
5. ANON. 'Notes on Samples and Testing' Handbook of the Manchester Chamber of Commerce. Manchester, 1913

BRITISH PATENTS FOR YARN BALANCES

29 Sep 1857	2508	R.Bodmer	Unusual pendulum
27 Feb 1863	549	J.H.Albinson & H.H.Cocker	Quadrant
21 Mar 1870	839	W.R.Lake (for L.J.B.Saladin)	Quadrant
16 Dec 1873	4137	W.Trafford	Yarn or bobbin scale
3 May 1883	2254	T.Knowles	Hex bar graduated
19 May 1886	6703	H.B.Barlow (for Emil Staub)	Equal-arm, wire beam
2 Oct 1889	15454	G.Thomas (for Emil Staub)	Steelyard
16 Jun 1890	9264	G.Thomas	Modified steelyard
25 Oct 1892	19190	M.H.Tomkins	Pendulum & cam
28 Jan 1907	2083	G.Thomas & G.Harling	Steelyard
16 Dec 1919	155802	E.Thirion	Chain balance
7 Mar 1922	196873	H.Beesley	Two pillars
25 Sep 1926	266628	British Research Association, S.G.Barker & J.J.Hedges	Cam & pendulum

FOR ASCERTAINING THE COUNTS OF SMALL SAMPLES OF COTTON, WOOLLEN, WORSTED, LINEN, OR JUTE CLOTH, ETC.

The Balance is supplied complete with three Templates in neat case for the Pocket.

INSTRUCTIONS

The Cloth which it is required to test must be cut exactly to the size of the template, using the one marked Cotton, Wool, or Linen according to the class of cloth. The threads are then drawn out and placed on the hook **A**, until the beam **B** is brought to a horizontal position and parallel with the right side arm of the Pendulum **C**. The number of threads required to bring the beam to this position = the number or counts of the yarn.

To test Yarn from Cops, wind the threads round the template and cut the yarn at both edges: then suspend the threads on hook **A** until the counts are obtained.

To test samples of Cloth double the size of the templates, the hook ∽ is suspended from the hook **D**, proceeding afterwards to obtain the counts in the usual way.

To test fine Yarns, from 100s, place the long hook ⊂ on the hook **A**, then add a sufficient number of threads to bring the beam to a horizontal position, and multiply the number by ten.

Example :—If eleven threads are suspended, eleven by ten = 110, the counts of the Yarn.

In coarse Yarns it is usual to allow 5 per cent. for the waviness ∼∼∼ of the yarn in the cloth.

It is usual **in testing coloured or dyed material** to allow about 4 per cent. for fine, 8 per cent. for medium, and 15 per cent. for dark colours, in arriving at the number. Example :— Yarns of a medium colour of 25s counts, will thus be 27s.

If the table on which the Instrument is placed is not quite level, the pendulum **C** adjusts itself and finds the true horizontal position. The small hook ∽ may be used to test the balance, by placing it on the hook **A**. The beam should then be parallel with the right side arm of Pendulum.

John Nesbitt, Ironmonger, Cutler, and Machinist,

42, Market Street, Manchester.

MANUFACTURER and SPECIALIST in YARN TESTING MACHINERY

For Cotton, Linen, Silk, Woollen, and other Yarns.

GENERAL MILL FURNISHER, SCALES, ETC. *ESTABLISHED 1854.* Tel. City 2[illegible]

Catalogues on Application Free.

Reitze Coin-tester

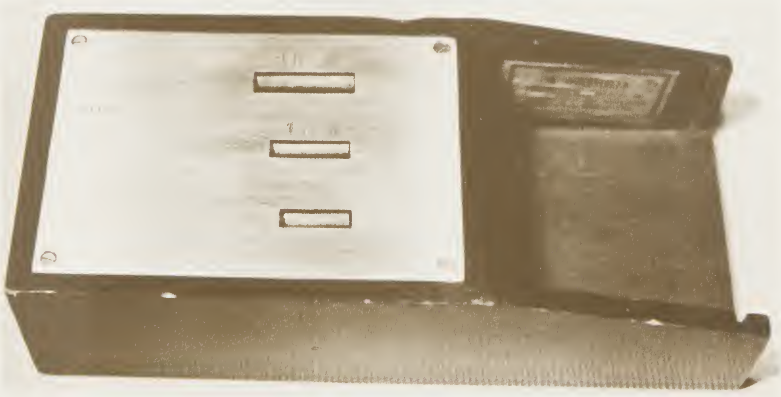
J. LINDNER

During the last few years, some coin testers have been found, patented by August Reitze. These coin testers have a very interesting and unusual story, which has been published in "Mass und Gewicht" no.2 & 5, the magazine of the German scale collectors society.

The original article contains many more exact dates and references to the background, so those wanting to know more must refer to "Mass und Gewicht".In spite of massive destruction during World War II, a lot of the history and details can still be recognised. Here is a short summary of the article for the members of ISASC;-

The mechanic, August Reitze of Hannover, obtained four patents for coin testers between 1877 and 1881. The principle on which his coin testers work, is the same as that for rocker balances.

Reitze's first patent was taken out in the Kingdom of Prussia on 4th. March 1877, with only a short description and a model of the machine. The coins must be inserted into slots marked with the names of the coins. Under the slot, the 'spoon' for the coin is one end of a lever. The other end is the weight counterbalancing that coin and the weight of the 'spoon'. If the mass of the coin is correct, the 'spoon' with the coin in it, will rock down and the coin will fall into the wooden box.



Reitze's coin tester for 30 Mark, 20 Mark & 5 Mark gold pieces.

PATENTSCHRIFT

1877. — № 299 — Klasse 42.

AUGUST REITZE IN HANNOVER.

Münzen-Sichtvorrichtung.

Patentirt im Deutschen Reiche vom 31. Juli 1877 ab.

Längste Dauer: 3. März 1892.

Dieser Apparat dient dazu, minderwiegende Münzen, namentlich Goldmünzen, während des Zählens von vollwichtigen auszuscheiden.

Derselbe ist in beiliegender Zeichnung dargestellt;

Fig 1 ist eine obere Ansicht des Apparates. Fig. 2 untere Ansicht der von dem Apparate losgeschraubten Platte *P* mit den Balancier hebeln *A B C*. Fig 3 ein senkrechter Langenschnitt des Apparates nach der Linie *a b* in Fig. 1. Fig 4 derselbe Schnitt durch den Apparat, wahrend ein vollwichtiges Geldstuck von dem Hebel *A* nach dem Kasten *D* geleitet wird.

Der Apparat besteht aus einem holzernen Kasten *K*, welcher oben offen ist und dessen Seitenwande an ihrem einen Ende schrag zulaufen

Ueber dem durch den geraden Theil der Seitenwande begrenzten, oberen, offenen Theile des Kastens liegt eine Metallplatte *P*, welche auf entsprechende, im Innern des Kastens anfgebrachte kleine Holzpfosten *e f g h* an ihren vier Ecken aufgeschraubt ist.

Diese Platte ist mit drei oder mehr Schlitzen versehen, welche in Lange und Breite von einander verschieden sind und dem Durchmesser sowie der Dicke der durch jede derselben zu controlirenden, bezüglichen Münze entsprechen. So ist auf der Zeichnung der Schlitz *A* von einer Lange, welche dem Durchmesser eines 20 Markstückes entspricht, wahrend seine Breite der Dicke eines solchen Stückes gleichkommt· etwas weniges an Länge und Breite ist dem Schlitz zugegeben, damit das Geldstück eben durchfallen kann. Der Schlitz *B* entspricht den 10-Markstücken und *C* den 5-Markstücken in Gold.

Auf der unteren Fläche der Platte sind hinter jedem Schlitze zwei verticale Metallsupporte *r r* angebracht, welche Kornerspitzen tragen und um die letzteren bewegen sich die Schildzapfen eines Hebels *A*' bezw. *B*' oder *C*'.

Diese Hebel sind auf einer Seite mit je zwei Wangen versehen, welche tiefe Rinnen *a*' *b*' *c*' bilden und mit ihren oberen Kanten gegen die Platte anstoſsen und in dieser Lage durch die auf der anderen Seite der Hebel befestigten Gewichte *a b* und *c* gehalten werden. Diese Gewichte sind so justirt, daſs das vordere Ende der Hebel nur dann niedergeht, wenn ein vollwichtiges Geldstück in den betreffenden Schlitz gelegt wird, minderwerthige Geldstücke der betreffenden Sorte den Hebel nicht zu bewegen im Stande sind, mithin in dem Schlitze gehalten werden.

Vollwichtige Geldstücke drücken die Rinnen *a*' *b*' und *c*' nieder und fallen nach der Abtheilung *D* des Kastens *K*. Damit die durchgefallenen Geldstücke nicht zu weit hinten im Kasten liegen bleiben, ist auf dem Boden dieses Kastens eine Fläche *K*' angebracht, welche die Münzen nach *D* befördert.

PATENT-ANSPRÜCHE: Die Platte *P* mit Schlitzen *A B C*, Hebeln *A*' *B*' *C*' und Gewichten *a b c*, welche Platte über einem passenden Behalter liegt und dazu dient, vollwichtige Geldstucke einer bestimmten Art von minderwiegenden Stücken derselben Art zu scheiden.

Fig. 1.

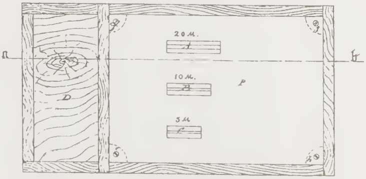


Fig. 2.

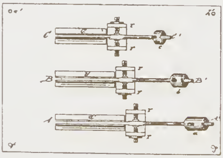


Fig. 3.

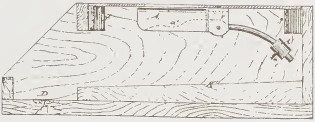
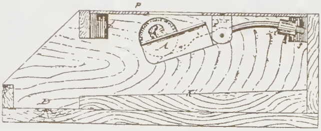


Fig. 4.



Zu der Patentschrift

On 1st. July 1877, the Patent Office of the German Empire was founded, and Reitze's Prussian patent was transformed into a German patent.The patent became void on 3rd. April 1879 because the merchant Eugen Bierstedt got the patent nullified, there being a machine like this patented in 1853 by George Davis;- "Apparatus for Testing Coin, patent no. 1978". It was shown in the magazine "London Journal, conjoined series V.XLV".(and in the ISASC Handbook, page 31 and 33).

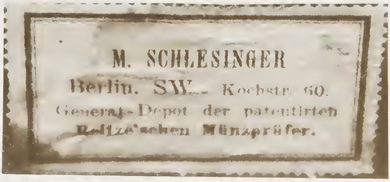
Reitze defended his patent without success and he lost his patent. He took his case to the High Court ,but unsuccessfully.

Who was this merchant, Eugen Bierstedt? He was the temporary owner of the scale factory "Alex Bernstein & Co." Presumably this factory produced the coin tester, using the same coins as Reitze's machine, which was patented by Aaron Bernstein in 1876 in Prussia,and valid for three years.

Bernstein was an editor and an honorary doctor of the University of Tuebingen, Germany. He also published articles under his pseudonym of A. Rebenstein. Bernstein heard about Reitze's patent when he was transforming his own Prussian patent into a German patent, so he complained about Reitze's patent to the manufacturer of his own apparatus, Eugen Bierstedt.

Reitze countered by altering his design and applied for patents in 1880 and 1881, for his two new versions, but both patents became void after the first year because the patent dues were not paid.

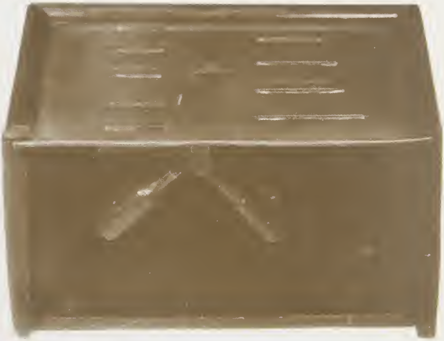
The underside of the plate, showing the "spoons" to the left and the counterweights to the right of the pivot points. The shape of the counterweights indicates that this is Reitze's 2nd patent.



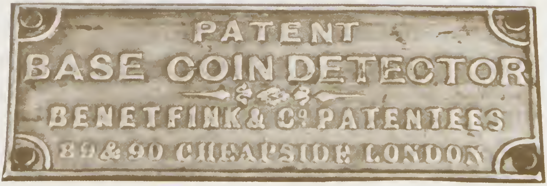
M. SCHLESINGER
Berlin. SW. Kochstr. 60.
General-Depot der patentirten
Reitze'schen Münzprüfer.

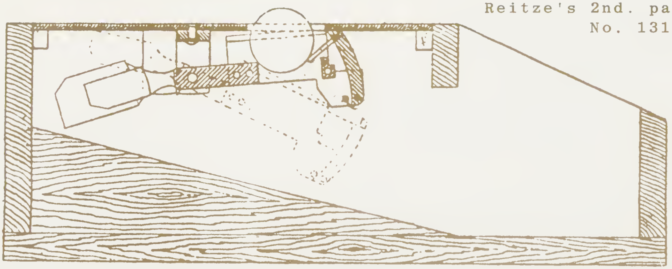
Label in Reitze's money prover, made by Schlesinger of Berlin.

George Davis's counterfeit coin detector, slotted into a wooden case with a sloping bottom which causes the good coin to roll or slide out towards the shop-keeper. Others have been seen fitted flush with the counter and a drawer under the counter to catch the coins. W & T Avery made a particularly ornate box, carved elaborately all over, with a shallow drawer in the bottom of the box, and they still sold their plain version in 1906, with additional slots, at right-angles to the others, for the crown and the five pound coin. (Price 12s.)

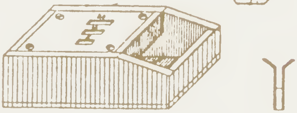


Benetfink & Co were advertising their version in 1913, with the advice, "The coin must not be dropped in but placed upon the Scale pan before being released from the hand in order to prevent momentum".





Reitze's 2nd. patent
No. 13164.



All Reitze coin testers seen up to this day have a label of the Berlin merchant, M. Schlesinger, who distributed cigars and possessed a coin tester factory. An example of the engraved number is;-

Patent
A Reitze
3634

3634 is not the patent number but probably the serial number of the production.*During that period coin testers were very important, which is why Reitze twice went to law against Bierstedt.

If anybody knows of the existence of any coin tester by A. Bernstein (but not the well-known hand-held coin rocker of Alex Bernstein) please let the author know. (Johannes Lindner, Zabel-Krueger-Damm 84 C, D-1000 Berlin 28, West Germany). Mr. Lindner has a lot of information on A.Bernstein, but he will publish it only if one of Bernstein's coin testers still exists.

*3634 seems a good production run for a tester that was only legally marketted for a total of three years. (ed.)

With grateful thanks to Dietmar Doerr for his helpful summary and translation.

Fraud

J. REG ROBERTS

Laws regulating weights and measures in the United Kingdom can be traced back at least a thousand years. The first recorded law enacting that all weights and measures should be uniform was passed about 965 A.D. in the reign of King Edgar and throughout the ensuing centuries the Statute Book contained numerous ordinances reiterating the decree that uniformity should prevail. By the late 19th century the basic Act was that of 1878, which with various amendments remained in force until 1963. Rapid changes in commercial practices shortened the life of the 1963 Act and it has been replaced by the very comprehensive Weights and Measures Act of 1985.

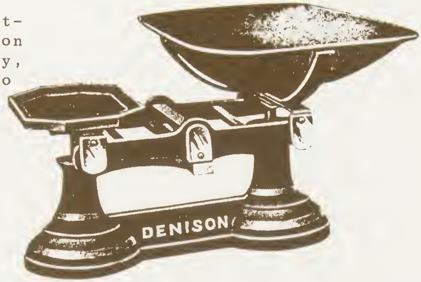
With the exception of bread and coal, the early Acts did not provide penalties for the giving of short weight and it was not until 1926 that the sale of food by weight or measure was regularised.The 1926 Act required most articles to be sold by net weight or in some cases, by gross weight if the container or wrapper did not exceed a specified weight. Certain goods could be sold only in specified and easily recognisable quantities, such as 2 oz. 4 oz. 8 oz. 1 lb. etc.This commodity control has been considerably extended and it may now be said that there is a general prohibition of short weight in any transaction.

A distinction has always been drawn between short weight (or measure) and fraud. Deficiences can occur through many different causes without there being any deliberate intention to defraud, for example, through the use of weighing or measuring equipment which is unsuitable or faulty, carelessness in the use of equipment and in packaging or storage, unavoidable evaporation or drainage in goods such as bread, cereals, meat, fish and poultry. The buyer suffers from any of these causes and for a seller to avoid conviction, he must show that the deficiency arose through circumstances beyond his control and despite "all due diligence and reasonable precautions".

Fraud is a different matter. Fraud is a deliberate intention to deceive and deprive the buyer of the proper quantity of goods he is entitled to. The law has always recognized the more serious aspect of fraudulent trading by the imposition of heavier penalties. Between 1878 and 1963 the maximum fine for a first offence was £5, with £20 for a second offence, with liability to imprisonment for a term not exceeding two months. The appliance used in the fraud was liable to forfeiture. Modern legislation takes a more realistic view of the offence of fraud by stipulating monetary penalties of up to two thousand pounds and a term of inprisonment of up to six months. The provisions relating to seizure and forfeiture of fraudulent equipment remain in force.

To satisfy a Court there has to be positive proof of fraud. Wilful intent has to be proved and it must be shown that someone has been or is likely to be defrauded. Evidence provided

Heavy-duty vibrating counting machine by Saml.Denison & Son Ltd, Hunslet Foundry, Leeds. Made to weigh up to 7,14,28,56,84 or 112lb. Prices ranged from 20s. to 63s. 1909 catalogue.



by an aggrieved purchaser is followed up, where practicable, by test purchases and prompt action to prevent interference with the fraudulent appliance. An inspector is always alert to the condition of equipment he examines on his normal and surprise visits to trading premises. Even without evidence of fraud, there is an offence if the equipment is found to be false or unjust, for which the fine could be two thousand pounds, with the usual forfeiture of the equipment.

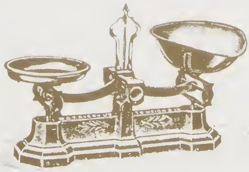
During the course of my lengthy period of service in W. & M. administration I encountered very many instances of short weight and fraud. Practically every variety of the older types of equipment and many different trades have been involved. Although the barrow boys (and girls!) were tough by the nature of their trade, I encountered little trouble when an offence was discovered, the usual attitude being "It's a fair cop". There were one or two instances of scales being knocked off the barrow to destroy the evidence, and one instance when the barrow itself was tipped up with the scale, weights and fruit and vegetables scattered over the pavement. Such cases were dealt with in Court under the charge of obstruction.

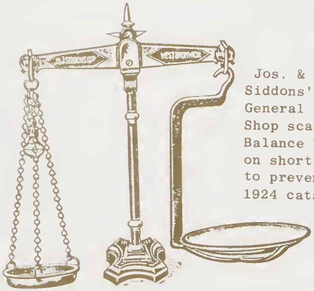
The most persistent offenders after 1945 were the street traders operating in the busy City centre. These barrow boys were alive to all sorts of tricks to increase their profits and there was a continual battle of wits between them and the officers of the W.& M. department. The scale used on a barrow was usually a 14lb. or 28lb. counter machine with a deep goods scoop. This is the best type to stand up to rough usage in the open air but unfortunately it is the easiest to use in a fraudulent manner. Invariably a weight or weights kept on the weights pan disguised any indication of a too-heavy pan on the other side. Among the articles found under goods scoops were 8oz. 4oz. or 2oz. weights. Sometimes they were inside the scoop, hidden under paper bags. One trader, who had previous convictions, was prosecuted for short weight sales and having an 8oz. weight concealed under the goods scoop of his scale. When asked to account for the presence of the weight he said to the inspector in a surprised tone "Now, how did that get there?".

Scales were found with the wrong, and of course, heavier scoop; the balance box or the caps over the bearings removed. Slightly more sophisticated methods lay in the use of elastic bands, either attached to the goods end of the scale and running to a nail in the base of the barrow or, more subtly, attached to the underside of the leg of the goods end and to the base of the scale. The advantage of the elastic band was its quick removal on the appearance of an officer. The barrow boy's scale was always tilted on the barrow with the goods end uppermost, causing an appreciable error- every little helps!

Prosecutions against shopkeepers, market traders and other retailers were not so frequent as those against itinerant vendors, but nevertheless, they did occur. Not only counter machines but beam scales, spring balances, self-indicating scales, platform machines and even weighbridges have been found in an unjust condition. Strange things have been found under the goods pan or plate- pieces of fat, lead and other metals, small weights, sweets, coins and even , in one case, a cigarette packet full of nails. A pre-decimal penny coin was found under the scoop of a sweet scale. It was carefully wrapped in paper which bore marks indicating that the coin had been there for some time. The shopkeeper said that children coming into the shop must have put it there! An accumulation of dirt in the goods pan, particularly in a scale used to weigh potatoes, was the cause of short weight in several instances. Self-indicating and semi-self-indicating scales were found to be unjust because they were not levelled properly. A beam scale developed a very bad error when the balance ball on an extra long rod was looped up over the beam end instead of hanging between the chains. A large beam scale used in a coal yard was 1½lb. against the customer, while platform machines and weighbridges were seriously out of balance due to neglecting to clean the weighing platform.

Avery's vibrating counter scale for sweets To weigh 1,2,4 or 10lb.1908 catalogue.





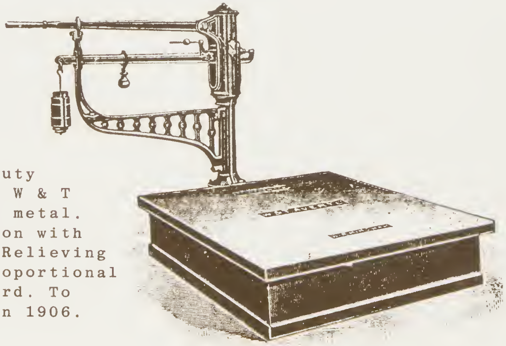
Jos. & Jesse Siddons' General Shop scale. Balance ball on short chain to prevent fraud. 1924 catalogue.

At a scrap metal dealer's yard, his spring balance was found to register only 102lb. when 224lb. was on the goods hook. The springs were found to be tied up! When an inspector visited another scrap yard the dealer knocked a piece of magnetised metal off the travelling poise on the steelyard. When replaced, the machine showed considerable errors in favour of the dealer when buying scrap.

Fraud can be committed, of course, when using an accurate scale or even without the use of a scale at all. Bumping the goods into the goods pan, manipulation of the scale by hand, (see page 851, EQM) and under-filling of packages out of sight of the customer. It was not unknown for a coal dealer to fill sacks by so many shovels full and thereby save wear and tear on his scales!

With regular testing and inspection it was rarely found that weights themselves were seriously unjust. That this was not always the case is evidenced by early reports of chief inspectors in Victorian times, when prosecutions for deficient weights were frequent. In about 1900 a London inspector found a 56lb. weight with the lead hollowed out and partially replaced by cork and thus being 25lb. 6oz. short! Even in 1944 the Manchester W.& M. inspectors reported that, from the quantity of lead consumed, (nearly two tons) it appeared that the 63,862 weights which had been adjusted, had , on the average, required nearly one and a quarter ounces to be added to each in order to make them correct.

The sale of bread by weight has given rise to many problems and short weight prosecutions were frequent. The trouble was usually tracable to the bakehouse, where insufficient allowance was made for loss of weight in baking or where there were defects in the equipment used. Loaves can lose weight through evaporation at all stages of distribution. Nowadays, improved methods of production, packaging and distribution, together with strict quality control, ensure that millions of loaves are turned out daily to a high degree of accuracy.

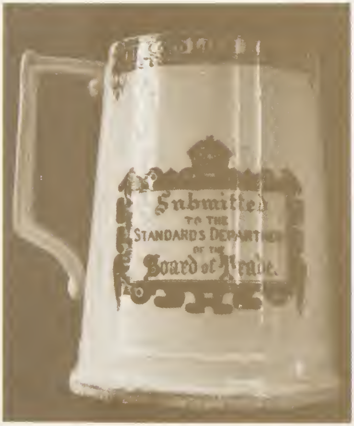


One of many heavy-duty steelyards, made by W & T Avery Ltd, to weigh metal. Made entirely of iron with steel knife-edges. Relieving mechanism. Loose proportional weights and steelyard. To weigh 5 tons. £45 in 1906.

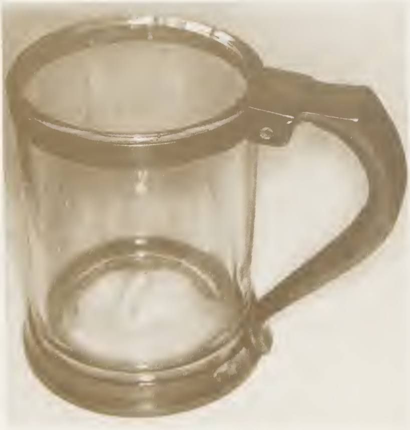
Fraud and short weight always seemed to be associated with the sale coal and other solid fuels, rarely due to unjust scales, but the under-filling of bags was a common practice, as was the delivery of a lesser number of bags, or the retention of part of a load of loose fuel after delivery was supposed to have been completed. The wilful damping of coke and other porous fuels was not unknown. When weighing up bags of coal, an empty bag was placed under the weights at the weights end of the scale. This was supposed to compensate for the sack on the goods end but frequently it was found that this tare sack was dry whereas those sacks on the other end were saturated with water. Differences of 7lb. were quite common. Many seriously short deliveries were discovered: individual bags up to 28lb. deficient and bulk deliveries 1 ton short of the alleged 5 tons. Sentences of imprisonment were frequently imposed under the old law and no doubt, the severe penalties liable under the 1985 Act will have proved an effective deterrent. One case taken to Court involved two men in charge of a load of coke delivered to a school. They were seen to drive away with over 9cwt. of coke still on the vehicle. On being stopped some distance away, the driver stated that he knew they were being watched and they took the coke away to fool the inspector! The magistrate was satisfied that there was another motive and he fined the two men. In another instance, a schoolboy saw coal being taken out of sacks by the men in charge of the lorry. He reported it to his headmaster who telephoned the W.& M. department. Prompt action resulted in a prosecution for short weight sacks of coal. In the press reports of the proceedings, it was the alert schoolboy who caught the headlines, telling the reporters "I couldn't let them get away with that". On another occasion, an inspector saw industrial fuel being delivered to private houses. He followed the vehicle to its legitimate, industrial destination and questioned the driver. The driver promptly ran away, abandoning his vehicle, which was driven back to the depot where the load was found to be 1 ton short.

Short measure by the use of deliberately falsified liquid or dry measures seems to have disappeared,but in the past, many traders were taken to Court for possessing metal or wooden measures with false bottoms or for underfilling when measuring out pulses, shell-fish, milk and other liquids. To a very great extent the sale of such goods is now by weight instead of by measure, or in closed containers, or by liquid-measuring instruments. Many years ago, an inspector approached a woman seated at a stall in a market, from which she was selling shrimps and cockles. On being told who the inspector was, the fishwife promptly concealed her pint measure under her voluminous skirts. The inspector decided that his warrant did not cover further investigation on this occasion.

Complaints from members of the public led to a series of prosecutions against licensed victuallers and/or their employees for short measure in the sale of whisky and other spirits. The shortages were due to the underfilling of small brim measures, usually performed at the back of the bar where the customer's view was obscured. The use of these gill, ¼ gill etc. measures has been largely superseded by the optic measures fitted to up-turned bottles of spirits. The measurement of beer has always provided problems as to how much froth should be regarded as part of the measure. Complaints were frequent and cases taken by W.& M. authorities met with varying fortunes in the Courts. The 1985 Act refers to the power of the Department of Trade to regulate the matter. As with spirits, the dispensing of beer has undergone a complete change. Stamped measuring instruments mounted on the bars are in full view of the customer, whilst stamped pint and half-pint glasses with the capacity defined by a line below the brim, seem to be increasingly preferred to the brim measures. Many years ago, there were instances of deceptive glass measures being used. They were made with thickened glass at the bottom and sides and when filled, they appeared to be of normal thickness. Some even had a maker's mark engraved device which could easily be mistaken for an inspector's stamp.



1 quart pot mug with the load line printed on the outside. 'Imperial Measure to the under side of coloured line. Submitted to the Standards Department of the Board of Trade'. Made before 1901.



1 pint glass mug with copper band & copper rim round the base. Beer to be put in up to the bottom of the band & froth hidden by the band. Made by Gaskell & Chambers Ltd, Birmingham. After 1914.

Instruments for the measurement of petrol and oil came under W.& M. control in 1929. With the application of the regulations it was found that some of the early types of petrol pumps could be manipulated to the detriment of the purchaser, for example, in the piston type by short stroking of the piston; by failing to prime the pump before use or by failing to drain the hose. Even the container type pump could be operated fraudulently, for example, by filling one container before its companion container was completely emptied. The enormous increase in vehicular traffic and the rapid development of forecourt equipment has revolutionised the dispensing of petrol and lubricating oils. The old type pumps have been replaced by flow-metering, associated with mechanical, electronic and computerised equipment; all the indications of quantity and price being in full view of the purchaser. In some of the earlier types of flowmeter pumps it was possible to disconnect the interlocking mechanism so that the pump could be used without the pointers being re-set to zero before each delivery. Some authorities used vehicles fitted with dummy petrol tanks to make test purchases at places where short measure was suspected.

Modern legislation deals very comprehensively with the sale of goods that are sold by weight, measure or number. A lengthy list of regulations spells out the requirements for specific commodities whilst the Packaged Goods Regulations deal extensively with the marking, making up and checking of goods by packers and importers; and testing by W.& M. officials. Sampling and testing are done usually at factory level and carried out by statistical methods. There should be little scope for short weight or fraud!

Many of the practices mentioned above have been eliminated by improved legislation, vigorous enforcement and advancement in weighing techniques. It must be emphasised that the perpetrators of fraud represent only a small minority of the trading community and the falsified equipment a tiny fraction of the vast numbers of weights, measures and instruments examined each year. There may not be so much weights and measures fraud nowadays but the modern Trading Standards Officer, with the widened scope of his duties, has many other directions in which to exercise his investigative skills.

This is the summary of the talk given to the ISASC meeting held at Kenilworth on the 17th April 1988 by J.Reg Roberts, retired Chief Inspector of Weights and Measures for the City of Manchester and lately Secretary and Chairman of the Institute of Weights and Measures Administration.

In memory of Michael, a research fund has been organised to look into the causes and relief of allergies.If you would like to contribute, please send your donations to ASGO,(the Allergy Support Group Oxford), the Appeal Treasurer, Mrs. M. Perryman, 22 Frenchay Road, Oxford, OX2 6TG, England.